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WE have information which we consider trustworthy, which convinces us that the La Noria Mining Company, with mines at Zacatecas, Mexico, and whose stock is dealt in principally at Pittsburg, is an utter failure and its management unworthy of confidence. It is needless to say more at present, but proposing investors may well hesitate before buying this stock, and those who have it had better investigate.

BRAZIL has formally abolished slavery by legislative act of its government, a far more satisfactory and less expensive method than that adopted here. This evidence of progress and justice will undoubtedly attract to this magnificent empire the attention of enterprising capitalists, and we may expect the development of its limitless, though almost unknown, mineral resources to follow. Brazil offers many advantages to those willing to engage in mining enterprises, and it will, in the not very distant future, become a popular field for mining and a market for American machinery.

WHY AMERICAN GOLD MILLS ARE PREFERRED IN THE COLONIES.

We have recently referred in these pages to the growing export business of American manufacturers of mining and metallurgical machinery and supplies. London *Engineering*, alluding to the statement of one of its correspondents that American gold extracting machinery in South Africa is preferred to English, says:

"The American batteries at work are said to do two and a half times the work of English ones of equal size, and if English manufacturers have thus allowed themselves to be outstripped in improvements it will not be surprising if orders for machinery be sent to the United States instead of to this country."

Yet American manufacturers are not nearly as enterprising in seeking a foreign market as they should be. Many of the orders that they have received have come to them unsolicited except through their advertisements in the ENGINEERING AND MINING JOURNAL, which, having the largest foreign circulation of any technical or trade paper in this country, brings inquiries from the ends of the earth. Manufacturers should, however, also make use of special agents to educate foreign markets up to an appreciation of the actual great superiority of American practice in mining and metallurgy, in mechanical appliances and in railway plant, bridges, etc. *Engineering* further adds the following, which we commend to our American manufacturers and bridge contractors:

"At the same time rivalry in another form is likely to tell upon English trade. The impending development of a network of railways in South Africa has attracted thither American agents who are preparing to compete with English firms for the supply of rails and rolling stock. A boom in railway construction is impending in South Africa, and English manufacturers are greatly mistaken if they fancy the orders will be restricted to a few hundred miles of line."

THE TIN AND COPPER CORNERS.

The break in the tin market, when in a short five days the price collapsed from £166 to £79 15s. per ton, is still the "talk of the town," of the world in fact, and people who helped to boom the metal up in the face of large and rapidly increasing stocks are now astounded at the natural and inevitable result of their own acts.

The effect of the high prices which the tin cornerers imposed was, of course, to increase stocks in Europe and afloat, or as our English cousins euphoniously term it, "the visible supply," from about 8400 tons, April 30th, 1887, to about 22,000 tons, April 30th, 1888. The total supply of tin increased from 35,891 tons in the twelve months ending 30th April, 1887 to 44,588 tons in the twelve months ending April 30th, 1888, while the consumption decreased from 37,338 tons to 29,773 tons in the same period. These figures illustrate well the effect of abnormally high prices on production and consumption.

The French syndicate, which of late was the cornerer, has for some time past been a free seller of futures, and so arranged its sales as to make its deliveries so rapidly at the close of the "deal" that the metal could not come back on its hands in any quantity before it let "the bottom fall out of the market." The syndicate is understood to have unloaded on the "boomers," who are now standing aghast wondering what struck them.

From many sides come the inquiries, "is copper to go the same way?" and "when will the collapse come?"

We do not pretend to report the inner secrets or intentions of the syndicate, but it is very evident that the copper deal is of a very different character from the recent tin corner. The copper production of the world is controlled for this year at least, and that from nearly every mine now producing is controlled for three years. The mining companies have sold their output for that time to the French syndicate, and the sales have been guaranteed by such responsible banking houses as Seligman's, the Comptoir d'Escompte, etc. So far as the mines are concerned, they will, no doubt, get at least the minimum price stipulated (generally 13 cents for Lake copper) during the next two or three years.

If the price of copper be maintained at 16½@17 cents, as at present, the quantity that will be produced in the next three years will be enormous, and probably far exceed the anticipations of the syndicate, while consumption will certainly be much less than if the price were, say, 12 cents for Lake, at which figure the world's requirements could be supplied at a profit. It is certain, therefore, that before the expiration of the three years, the syndicate will have an enormous load of copper to carry, a load which will continually increase until it would eventually swamp even the strongest syndicate.

There is little use in speculating on the final outcome, which can not occur for two years yet, and which may be affected by modifications in the present agreements should mutual interest dictate this necessity. For some time to come every thing favors the stability of the syndicate and of prices above the minimum basis. This, of course, does not necessarily keep them where they are; in fact, we believe the syndicate would serve its own interests best by keeping prices but little above the basis—which was too high any way—and thus encourage consumption while discouraging any rapid increase in production.

THE PRODUCTION AND USE OF CHEAP PURE OXYGEN.

It is very generally conceded that the profusion in which it is distributed throughout nature, and its wide range of attractions for other elementary bodies, have made of oxygen the foundation upon which to build up the entire framework of modern chemical theory. It constitutes about one fifth by volume of the air we breathe, where, as a mer-

mixture, it is not in any way combined with the nitrogen of which the remaining four fifths are mainly composed; and, while water contains eight ninths of it by weight, it enters for about 50 per cent into the composition of the entire terrestrial crust. The respiration of all animals, fishes, and birds; the phenomena of oxidation, combustion, and acidification depend alike upon its agency, and it is therefore easy to conceive of the utter darkness and ignorance which must have prevailed in the world of science during that period which preceded the discoveries of LAVOISIER and PRIESTLY.

With the present more fully developed state of our knowledge, and more complete recognition of the part played by oxygen in nearly all the useful arts, however, it is not unnatural that many persevering efforts should have been made to obtain it in a state of purity from the air, by freeing it from the enormous volumes of nitrogen with which it is there surrounded, and which, while they do not perhaps materially lessen its final action, frequently exert upon it a very prejudicial and retarding influence. If all these attempts have hitherto been practical failures, it must be because we have constantly fallen into the error of seeking to fix the oxygen itself, instead of devoting all our energies to the search after some cheap and plentiful reagent, which, by readily combining with the nitrogen would give us a compound of immense value, and leave us our no less precious free oxygen as a bye product. Hence, while we are quite familiar with the chemical reactions which result from heating the oxide of barium in a current of air, and fully recognize our indebtedness to the illustrious BOUSSINGAULT for having discovered them, we are nevertheless extremely doubtful of their commercial applicability, and can only hope that Messrs. BRIN & CO. have not been too sanguine in their expectations.

Upon these very simple acts of combination at one temperature and dissociation at another—

(1). BaO at 900 degrees F. + purified air = BaO_2 + nitrogen.

(2). BaO_2 at 1200 degrees F. = BaO + oxygen,

and by the aid of very special and, it must be confessed, very intelligently constructed apparatus, this firm has based its patented process, and is now said to be actively engaged in the manufacture of oxgen in Paris and London.

The air of the atmosphere is first deprived of all moisture and carbonic acid gas by pumping it through beds of caustic soda or lime, and is then forced into a series of tubes filled with small lumps of chemically pure baryta heated to 900 degrees F., where the oxygen is absorbed, and the nitrogen conducted to suitable receivers connected with the tubes. When the baryta is thoroughly oxidized, the air current is suppressed, the nitrogen valve is turned off; that one provided for the exit of the oxygen is opened: the temperature is increased to about 1200 degrees F.; a partial vacuum is created; the oxygen is expelled and carried to a gasometer, and the whole operation is then recommenced with the same supply of baryta over and over again *ad infinitum!*

With no reliable data as to the cost of production, and in the absence of any scheme for utilizing the nitrogen, it is somewhat difficult to foresee the exact economic uses to which this oxygen may be immediately applied; but is fair to assume that, if all our information is otherwise correct, its selling price will scarcely exceed one cent per cubic foot, and that it may consequently receive attention from the larger metallurgical establishments, and give an impetus and a new direction to the bleaching and other industries. The chemists in our gas works may also see in it an excellent means of revivifying their iron oxides, a means which will enable them to discard the usual costly and cumbersome manipulation, and in short, however we may regard it, we cannot fail to appreciate the importance it must acquire. That this is the general sentiment among scientists may be gathered from the lecture delivered and illustrated by numerous experiments at the Liverpool section of the Society of Chemical Industry on the 7th of March last by Mr. THOMAS FLETCHER.

Ordinary coal gas and oxygen prepared by Brin's process were used, the latter being supplied in steel cylinders two feet long by five inches in diameter, containing about twenty normal cubic feet of the gas. The blow-pipe differed from the ordinary instrument, in that its jet, instead of being formed with a single hole, is flat on the end and is drilled with a circle of holes, each sufficiently fine to pass three to four cubic feet of oxygen per hour under very heavy pressure. With these appliances, the lecturer is reported to have readily fused the end of a $\frac{1}{4}$ inch wrought-iron rod, brazed several $\frac{1}{8}$ inch copper pipes as quickly as a tinman soft-solders light sheet tinned iron; fused a hole through a four inch wrought-iron steam pipe; put a hole through a $\frac{1}{4}$ inch iron plate in thirty seconds, making also a slot, in a straight line, at the rate of nearly two inches per minute.

To our coppersmiths and boiler-makers, and, indeed, to the great mass of our mechanical engineers, these blow-pipe results will speak volumes, and we trust that the promises they hold out may be fully realized. That they *can* and will be ultimately realized, there is not the shadow of a doubt; but, as we have already hinted, we are still, for our own part, somewhat inclined to question whether Messrs. BRIN & CO. are working at the proper end; whether they are able to produce their oxygen gas at a sufficiently low price to make it economically applicable, and—what is even more important—whether, by their present method, they can produce it at all in a state of absolute purity. If they can do both, they have solved a problem which, in addition to its own importance, must soon lead to the solution of others of even greater moment. If it should turn out that they can do neither, that their gas is too costly, or that it contains 30 or 40 per cent of air, we shall have to bear a serious disappointment, made all the more bitter by our knowledge of what "might have been" had they succeeded!

SOME MODERN IMPROVEMENTS AT EUROPEAN COLLIERIES.

While it is true that the work at some of our anthracite collieries is unequaled in any other part of the world, either for quantity of output in a given time or economy in labor, it is also true that our great coal companies, half a dozen of whom own nearly the entire anthracite fields in Pennsylvania, have not shown that enterprise which should characterize intelligent American concerns in profiting by the experience gained in other parts of the world. The superintendents at the mines are in general exceptionally able men, and the excellent results attained are for the most part evolved from their own experience; but it is not in the least derogatory to them to say that if they were kept better informed of the progress made in other countries they would greatly benefit by it; their native ingenuity would promptly adapt all that is desirable in foreign practice to our home conditions, and the result would certainly be still greater economy at our mines, and still higher praise for the managers who had made the money-saving improvements.

The superintendent of large collieries is a very hard-worked man, and it is absolutely impossible for him to keep read up in all the technical literature, in different languages, where many of these improvements are described, much less can he get away to visit the mines in different parts of the world, to see one little thing here and another there, that, though extremely important in money-saving, do not, for years after their adoption, find their way into print. No investment these great companies could make, either collectively or singly, would bring them a better return than the employment of consulting engineers, who would keep their superintendents advised of the improvements in practice in other mines both at home and abroad, consult with them concerning questions of practice, and advise the Boards of Directors as to the technical matters that they are constantly called on to discuss and decide.

The immense value of such services was well illustrated in the benefits which came to the American steel works that employed the late Mr. ALEX. L. HOLLEY to perform for them similar duties to those the consulting engineers of the mining companies would be intrusted with.

In the absence of such special advisers, the engineers and managers of the mines have to rely chiefly on technical papers for this valuable information concerning the improvements introduced elsewhere, and since the coal companies have usually shown little interest in the subject, and have given faint encouragement for the expenditure of the necessarily large sums which the development of this department of journalistic enterprise would involve, the subject receives less attention in our technical papers than it deserves.

Our bituminous coal mines, being generally worked above water level, present different conditions, and can not be compared with deep mine work so far as machinery is concerned.

A recent number of the *Bulletin de la Société de l'Industrie Minerale*, St. Etienne, France, contained a very interesting and elaborate paper by Messrs. MALHET, DE GOURNAY, and SUISSE on "Mining Appliances in Westphalia." From this paper, which has also been abstracted in the Transactions of the Institution of Civil Engineers of London, we take a few notes that may be of interest to many of our readers.

Wire rope testing at the collieries is practiced much more generally abroad than in this country, where no doubt many accidents would be prevented if greater attention were paid to this subject. At the Carlsglück colliery near Dortmund, the ropes of steel, $1\frac{7}{16}$ inches diameter, weigh 3 pounds per foot. Each of the 126 wires which compose them has a strength of 992 pounds when new, and it will stand from 14 to 17 flexions through an angle of 180 degrees, when held in a vise with jaws rounded to a radius of $\frac{3}{16}$ inch. About 13 feet of the rope is cut off every month and the wires tested. It is found that they increase somewhat in tensile strength, the average breaking strain being 1008 pounds, but they will endure only six or seven flexions. When they will break with five flexions the rope is changed.

The effect of the acid water in our own coal mines in rendering steel wire brittle has long been recognized, but this German experience would indicate that the shock, or vibration, caused by suddenly lifting the load, and which is naturally most severe near the end of the rope attached to the cage, greatly and rapidly affects its elastic limit, a point which may have a much wider application than to colliery ropes, for it may apply to various structures in steel which are subject to heavy shocks or vibrations.

The cage props at this colliery consist of hydraulic cylinders, worked from an accumulator and a small pump, by the admission of water (or, in winter, of vaseline); the cage is raised to the exact position desired. The consumption of vaseline is said to be 20 pounds a month. We are told that this appliance "saves time in banking, and avoids strains on the ropes and machinery due to repeated reversals of the engines, but is costly and difficult of maintenance."

In the Bonifacius colliery, near Essen, which is very fiery, in driving parallel roads, holes for ventilation 12 inches in diameter are bored through the pillars by means of a hand-boring machine. This consists of a toothed crown, mounted on a stem, passing through a screwed sleeve for feeding up the tool to its work. The stem is composed of short lengths screwed to each other. The motive power is given through a worm-wheel and worm driven by two crank handles. Four men can bore 60 feet in eight hours.

At this colliery extensive use is made of Delta metal (copper, zinc and iron, a compound which can be forged or cast, but not welded) for valves, bolts and piston rings of pumping engines, where acid water has to be encountered.

Our own aluminum alloys (made by the Cowles company) would probably be equally well adapted for such purposes.

At the Rhein-Elbe colliery a safety apparatus to prevent overwinding rolls a weight on to the brake-lever instead of operating the throttle-valve of the steam brake.

Many of the collieries use a balance rope attached to the bottom of the cage (any old worn-out rope is suitable for this), instead of using conical drums, and the results are said to be in favor of the balance-rope. The chief drawback is the additional weight it puts on the hoisting rope.

The steam pipe to the pumping engine at the Rhein-Elbe colliery is 25 inches diameter, with copper expansion joints. Steam is suddenly turned on full; formerly it was turned on gradually, which caused many ruptures through unequal heating of the upper and lower sides of the pipe. The hoisting at this colliery is from a depth of 1410 feet, and the trip is made in 45 seconds.

At the Hanover Colliery, near Bochum, the manager, Mr. KOEPE, applied his system of winding with a single rope, simply passing it around a lagged fly-wheel, 24 feet 9 inches diameter, on the engine shaft. The head-gear pulleys, nearly 20 feet in diameter, are both in the same vertical plane, and the cages are attached to each end of the single hoisting-rope. The cages are four-decked, and the catches at bank bear upon their upper frames. The length of the rope has to be very accurately adjusted by screw couplings at the point of attachment to the cages. In some places the rope is continued through the cage and is clamped below it, so that the position of that part of the rope which is most strained by the lift can be changed from time to time.

Mr. KOEPE proposes fixing the fly-wheel and hoisting engine directly over the pit, as was proposed at Plymouth, Pa., by Mr. LANCE, about twenty years ago.

Mr. KOEPE'S system has been adopted in Upper Silesia, at Stassfurth, and in England, but, on the other hand, it has been abandoned at Westhausen and Oberhausen, and is apparently making no progress in its native district.

At the Rhein-Preussen Colliery the headings are driven by Brandt's hydraulic boring machine. Progress is at the rate of 112 yards per month, three shifts of five men each being employed.

The speed in ordinary hand drilling is not given, but this work for a machine in soft coal does not appear to offer any advantages either in cost or speed over hand-work in this country.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
All letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Alaskan Mining Bubbles.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: You are on the right track. Alaska has promising mines, but it has also plenty of wild cats. Prick the Nowell bubble. Nowell himself belongs to the dangerous class of promoters; he does not pretend to know much about mines, but affects the manner of a well-to-do farmer, an every-day, so-called common-sense kind of a man. His sophistry counts for more than years of study and hard-earned experience. Some Bostonians employed a competent engineer who went out and examined the "mines" about two years ago, and he appears to have kept them out of the thing; but Nowell's set don't seem to want advice or to know the facts, which the ENGINEERING AND MINING JOURNAL so faithfully gives.

BOSTON.

A Chance for Geographers.—The committee at Madrid, Spain, having in charge the Christopher Columbus celebration offers a prize of $10,000 for the best book, in any language, on the geographical discoveries of Portuguese and Spanish explorers prior to the time of Magellan. About the end of this month the Queen Regent will unveil a monument of Columbus at Palos.

THE ALABAMA MEETING OF THE INSTITUTE OF MINING ENGINEERS.

The American Institute of Mining Engineers held the first session of its fifty-first meeting at Birmingham, Ala., on the 15th inst.

It is needless to say the Institute was received with proverbial Southern hospitality, and the meeting both in numbers and the influence of those attending it has been very successful.

The engineers were welcomed in an address by Col. E. T. Talliaferro, followed by Mr. J. E. Webb, on behalf of the Chamber of Commerce—and these were gracefully responded to by Professor Wm. B. Potter, President of the Institute, and by Dr. R. W. Raymond, Secretary of the Institute.

Among the papers read at the meeting was one by Mr. Wm. Bowron, manager of the South Pittsburg Division of the Tennessee Coal and Iron Company, on the cost of producing iron, in which he showed that after allowing 3 per cent for repairs and 6 per cent for interest, iron can be made in the Birmingham District at $9.04 per ton. This figure, which corresponds with what has already been published in the ENGINEERING AND MINING JOURNAL, is authoritative, and may hereafter be cited as the possible cost in 1887–8, with well managed furnaces in steady operation in this district.

Mr. Alfred W. Brainard, of Birmingham, described the recent experiments of Mr. James Henderson in making high class steel at Birmingham from phosphoric pig-iron.

This process and the success which has attended Mr. Henderson's recent experiments have been fully described in the ENGINEERING AND MINING JOURNAL April 7th and 14th, 1888, and in earlier numbers. On Tuesday afternoon the engineers visited the immense brown hematite ore banks of the Pioneer Furnace Company, at Grace's Gap, the fossil ore mines at Redding, and the Sloss Company's ore mines.

An evening session was held, in which Prof. W. B. Phillips read a very interesting paper upon "Phosphate Slag." This evoked so much discussion, that it occupied the entire session. The meeting will greatly extend the knowledge of Southern mineral resources among the engineers who are the advisers of investors, and it can not fail to bring substantial benefits to the districts visited

THE ROASTING AND CHLORINATION OF GOLD ORES CONTAINING LIME.

Written for the Engineering and Mining Journal by J. H. Burfeind, M. E.

It is not my intention to treat the above subject in a general way, but simply will call attention to a few facts which may be of interest.

A sample of concentrates from a large lot was handed me with the following remarks:

Why is it that these concentrates if roasted without salt will only yield about 50 per cent of their contents of gold to chlorine gas?

What is the cause of uneven results if roasted with salt?

Why is it necessary to add salt?

Ferricyanide test is used to ascertain if a "dead roast" has been obtained before any charge is removed from the furnace.

I made analysis of the concentrates, found them to be pure iron pyrites (no arsenic, antimony, copper, lead, zinc, etc.), with 14 per cent of silica and 2 per cent of lime, which latter was present as calcspar.

I roasted two samples in a muffle, one with and the other without salt, treated the roasted material with chlorine, gas and bromine water. Only a trace (72 cts.) of gold was left in either sample. Roasting with or without salt took the same length of time to obtain a dead roast.

I concluded that salt was superfluous, but the fact that if roasted on the large scale without the addition of salt only 50 per cent of the gold can be obtained remains.

I referred to Küstel, Aaron and other authorities, and found the statement: "Salt must be added if lime or talc is present in the gangue." Nothing more. The answer to the question, Why? is not given.

The fact that even with salt the results were not uniform, and that frequently tailings would contain a large amount of gold, even when the test made with ferricyanide indicated a "dead roast," convinced me of the unreliability of that test if lime is present in the material under treatment. It does not indicate either the presence or absence of sulphate or sulphide of lime; in fact, does, therefore, not give the slightest indication if the salt has fulfilled its work for which it is added.

I obtained a sample of tailings containing about $5 of gold; treated them with an excess of chlorine and also of bromine; no gold could be extracted. Analysis proved the presence of lime either as a sulphate or sulphide, which I did not determine. Ferricyanide indicated the total absence of ferrous salt. I then re-roasted the tailings with salt, determined the chloride of calcium in a portion of it, and when nearly all the lime present was left as a chloride, I again subjected the tailings to chlorine and bromine. Result, only a visible trace of gold was left.

To ascertain therefore to a certainty that a charge is ready for the chlorination tub, it is necessary to determine exactly in what shape the lime remains. Ferricyanide will only indicate the absence of a ferrous salt, and if this test is only used the results must be unsatisfactory for reasons given above. Tests made on material worked on a large scale verified the above to my satisfaction.

Text books state that if lime is present it will remain in the roasted material as sulphate of lime. I experimented with chlorine, bromine and sulphate of lime; found reaction very slow indeed.

Added sulphate of lime to the roasted material, treated it with bromine water and chlorine gas; results, tailings as low as without the sulphate of lime. "The day began to dawn."

Roasting in a muffle the charge does not get in contact with the fuel or the gases thereof, the carbonate of lime is converted into sulphate of lime, the heat obtainable in such furnace will not decompose it, it remains as such. It does not interfere in the subsequent treatment, consequently I obtained as good results without salt as with it when I roasted the material in the muffle. It is different if the material is roasted in a reverberatory or cylinder furnace where the charge comes into contact with the fuel or gases thereof. The lime is first converted into a sulphate, but part of the carbon burns at the expense of the oxygen in the sulphate, and the sulphide of calcium is

left. And here comes the difficulty. Unless this sulphide is entirely decomposed, no satisfactory results can be expected in the leaching vat. If chlorine or bromine come in contact with sulphide of calcium in presence of water, hydrogen sulphide will be evolved, and this gas in turn will precipitate gold already in solution as sulphide of gold. Kustel states that this makes no difference, as it will be redissolved by the excess of the chlorine. I beg leave to differ. It is not redissolved by any excess that may be used, but is invariably lost with the tailings unless they are re-roasted and retreated. This statement I base on several tests made, and also on the fact that such material worked on the large scale gives the same result if treated for 36 hours, or 72 hours with any amount of chlorine gas that will be absorbed.

Some writers claim that the lime remains in the caustic state, the chemistry of which is not plain to me. That it is not the cause of the trouble in the above case, I hardly need mention.

Résumé. To use the Plattner process on material containing lime. It is necessary that no sulphide of calcium be present in the material when it enters the leaching vat. To ascertain this to a certainty, see that the lime present is in the shape of chloride, if the roasting is done with salt in a furnace in which the charge comes in contact with the fuel or gases thereof. In case the ore is roasted without coming in contact with the fuel or gases thereof, sulphide of calcium will not be formed. No addition of salt is required, and any test indicating the presence or absence of ferrous salt will answer fully.

I have purposely avoided giving equations, and rehearsing well-known theories, I thought superfluous, which will explain many seeming omissions in the above.

RECOVERY OF AMMONIA AND TAR FROM BLAST-FURNACE GASES.—II.

(*Concluded from page* 340.)

The Addie or Langloan Process.—The main feature of this process is the mixing of sulphurous acid gas with the furnace gases, in sufficient quantity to combine with the ammonia; and the subsequent washing of the gaseous mixture in towers or scrubbers. At the Langloan works there are four closed and two open-mouth furnaces, using 280 to 300 tons of coal per 24 hours. The main carrying the gas is so arranged as to deposit most of the dust and heavy pitch before delivering it to the scrubbers.

The Feldtmann Still is an apparatus for the distillation of ammoniacal liquor, and is reported to give admirable results. The liquor is run into a large overhead supply tank, from which it passes into a feed tank fitted with a ball-and-cock arrangement that regulates the inflow to a nicety. From the feed tank it passes through pipes to the bottom of the condenser. The latter contains a large number of tubes, through which the liquor ascends to the top of the large column. This large column is similar to the smaller one, and each is provided with a number of chambers fitted with cups and overflow pipes. The liquor finding its way from one chamber to another meets an upward current of steam. It then falls into the bottom part of the still, where it is mixed with an excess of milk of lime by means of a small force pump. The lime agitator is below the level of the second tower, and the lime sludge from this tower is run back into the agitator, so as to economize the consumption of lime. A perforated plate in the agitator keeps down the froth as much as possible, and the steam pipe prevents the lime from settling at the bottom. The liquor mixed with excess milk of lime overflows through the tube into the second column, the overflow pipe having a end plug which can easily be removed if the pipe becomes choked, as is shown by a gauge glass. In the second column the process is repeated. The gas passes through the lime column, then through the large column to the saturator. This is fitted with a large leaden bell in which the sulphureted hydrogen, if any, is collected and taken off by a pipe. The gas is trapped with acid, and the hot vapors pass on to the boilers and are burned. The use of superheated steam hastens the process. The steam and gases surround the tubes through which the cold liquor is circulating. If the gases are not burned directly at the boilers they are passed through hydrated iron oxide. The condensation apparatus above described is thought by Mr. Jones to be unnecessary at Scotch works, as the gases do not contain an appreciable amount of sulphur. With iron-works liquor free from sulphides, a very fine white ammonium sulphate can be made with inferior pyrites acid.

The present annual output of ammonium sulphate from blast-furnaces is about 5400 tons.

Mr. Jones has furnished the ENGINEERING AND MINING JOURNAL with the following additional information, which gives points of interest which have come up since the publication of his original paper:

The different processes being worked in Scotland for the recovery of by-products from the waste gases have now all passed beyond the region of pure experiment.

The Messrs. Baird, of Gartsherrie, have plant now laid down and working capable of handling the gases of the fourteen furnaces, and of working up the immense amount of tar produced by all processes of condensation. In the recent additions to their ammonia works, the double-decked scrubber has proved very successful in completely depriving the gases of their ammonia and tar, otherwise, practically speaking, the plant is simply a duplicate of the old plant.

The author is of opinion that the Messrs. Baird could have treated their ammonical liquor much more economically in a vertical tower with superheated steam, than by the antiquated system of distillation in horizontal boilers.

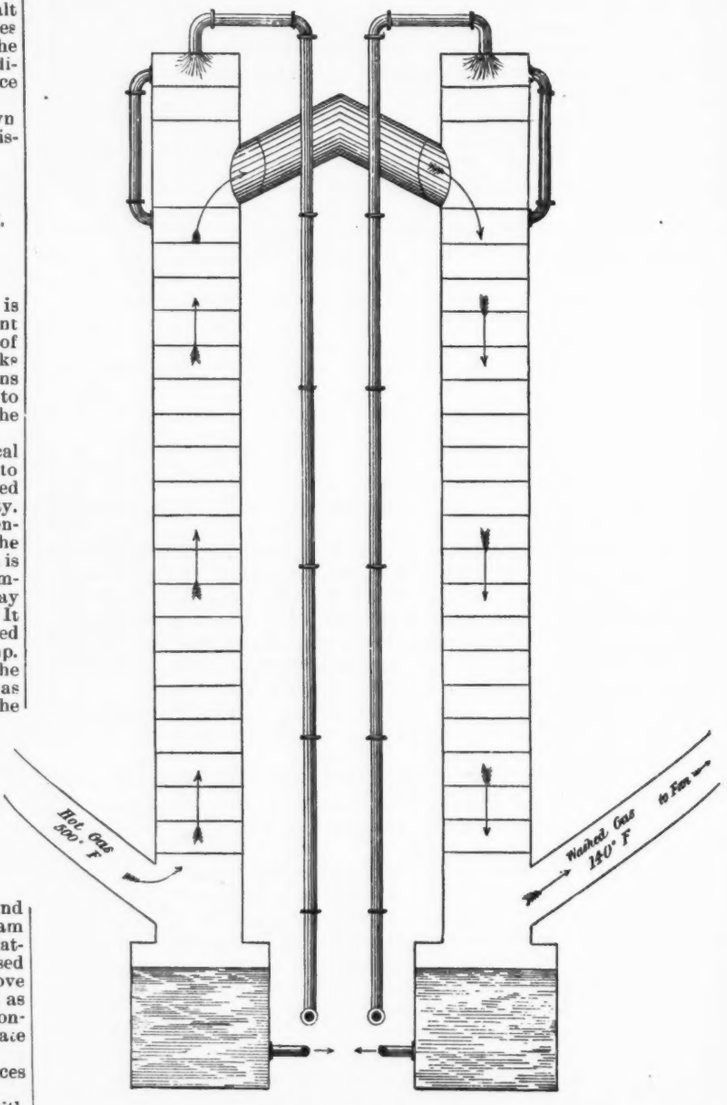
Very considerable difficulty was at one time experienced in getting rid of the pitch, and especially the crude oils, but owing to the recent adoption of this crude oil as an illuminant for public works, open yards, squares, railway depots, etc., an immense demand has been created for it, and the oil can now be easily disposed of at 1½ d. per gallon, and it is likely to reach an even higher figure than this. These oils are burned with air under pressure, in lamps of the "Lucigen" type.

Messrs. Baird have other ammonia works in successful operation at Muirkirk, and the Lugar Iron Works in Ayrshire. They are simply duplicates of their Gartsherrie plant, with a few alterations and additions to suit the local conditions.

Thus at Lugar, for example, where there is an abundance of water, no atmospheric condenser is in use, but the water condenser. These works gravitate into the Lugar River, a fishing stream, so that the lyes, etc., from the ammoniacal stills have to be evaporated to dryness, or nearly so, in huge, long, shallow rectangular pans.

This can be done there very economically, owing to the large amount of excess gas which they have and the very cheap labor.

The ignited gas is simply allowed to pass over the surface of the pans, which are covered in, and the residues are removed by side doors. The author would suggest that these residues, which must be rich in sulphate of potash, might be treated for the same as at the Summerlee Iron Works, or used simply as a manure.



Addie or Langloan Process.

The plant designed by the late Mr. A. G. Henderson, Gas Engineer, London, has not so far been adopted.

The process of washing the hot gases with dilute sulphuric acid, as carried out by the Messrs. Neilson, at the Summerlee Iron Works, is substantially as described in detail by the author at the meeting of the Iron and Steel Institute in Glasgow in 1885.

At these works there are four furnaces fitted with the usual cup and cone arrangement for charging and the collection of the gases, and three furnaces open-mouthed, and having a portion of their gases taken off by draught. The firm are altering these to the more modern arrangement, and they have now one in operation, and are busy altering the other two. These three furnaces are much smaller. The existing ammonia plant is at the east end of the works, alongside of the four large furnaces, and the existing equipment is only capable of treating the gases of those four furnaces. Owing to the want of space, it will probably be found necessary, therefore, to erect ammonia plant at the west end of the works to heat the gases of the three furnaces. This is, of course, a decided disadvantage.

In all these hot washing processes not more than 20 per cent. of the tar is collected, unless under certain special conditions.

The separation and treatment of the tar, which is saturated with rich

sulphate of ammonia liquor, is the trouble with this process, and especially the distillation of the class of tar produced.

These difficulties have, however, been successfully surmounted. The liquor is treated as described, and all the tar, "skimmings," etc., are put into a large horizontal boiler; water is added, and air under pressure blown through to thoroughly intermix the tar and water. It is then allowed to settle, and the weak liquor used to dilute the vitriol for the scrubbing towers. This washing process is repeated three or four times till practically all ammonia is removed from the tar.

The tar was at one time distilled in boilers in the usual way, but it was found that the very large amount of mineral matter contained in it settled down to the bottom, forming a hard crust, the result being that the boiler was quickly destroyed by burning, which was greatly aided by the fact that a very high temperature is required to "pitch" these tars. This, however, was overcome by the adoption of the following description of still.

The bottom consists of an ordinary circular cast-iron still bottom 10 or 12 feet in diameter and 4 feet deep, cast with broad flange. On to this is bolted the body of the still, made of Siemens steel boiler plate riveted together in the usual fashion, and having a large manhole door flush with the level of the flange of the cast-iron bottom. The top of the still is fitted with the usual dome, air pipe and pipe for conveying away the oily vapors, etc.

The cast-iron still bottom rests on a mass of checkered brick work, and the heat and flame from the waste-washed gases, play only on the cast-iron, the steel body of the still being built in brick work to prevent loss of heat by radiation.

Eight of these stills are in use, and are sufficient to treat all the tar produced. They are charged with 9,000 gallons of tar, and it requires over a week to work off one charge. This at first sight may seem a most extraordinary long period in which to treat such a small quantity of tar, but it must be recollected that these tars are very difficult to distill, owing to the excessive amount of water which they contain, and the large amount of mineral matters present, which have a tendency to settle down on the bottom of the still, forming a hard, impervious non-conducting material, which renders it impossible to push on the distillation, as a "boil over" or a burned still bottom may result.

When the distillation is completed, instead of running off the hot fluid pitch into a close boiler to cool, before running into the pitch beds, it is the practice at Summerlee to allow it to cool in the still itself, and run the pitch right off into the beds. The hard carbonaceous mass at the bottom of the still may then be removed if necessary.

The "coky" parts are put back into the blast-furnace, and the mineral parts treated along with the flue dust for sulphate of potash.

The tar mud from the bottom of the towers and all carbonaceous dust from the gas tubes is burned in heaps, and along with the dry flue dust is placed in a large tank and treated with water; the watery solution, which has a gravity of 20 to 30 degrees Twaddell, is settled and then boiled down in an open cast-iron pan with waste gases. A fine white salt containing as much as 70 per cent of sulphate of potash is thus produced, and is worth 1s. 6d. per unit of potash sulphate.

This is now being made in lots of five tons and upwards.

At one time some difficulty was experienced in bringing up the percentage of ammonia in the finished sulphate crystals to 24 per cent, which is the commercial standard. This was owing to the large percentage of sulphate of potash and soda, and moisture contained in the sulphate of ammonia.

This has now in a great measure been overcome by treating the crystals as they are "fished" out of the crystallizing boxes in a hydro-extractor or centrifugal machine, as in the sugar factories. A very good, dry, white, clean sulphate is thus obtained, having much less tendency to turn brownish red on exposure to the atmosphere, from organic contamination, and containing regularly 24 per cent of ammonia.

The present make of sulphate of ammonia at Summerlee by the above process is about 70 tons per month.

The Messrs. Addie, of the Langloan Iron-Works, have also made a very considerable advance in their method of recovering ammonia from the furnace gases.

The system of producing the sulphurous acid gases by burning the carbonaceous pyrites, known locally as "Maggie," in kilns made out of old boilers has now been abandoned.

It was found that the material had a great tendency to fuse and melt in places, stopping the free passage of the gas and leading to very bad results as far as the percentage of sulphur contained in the calcined material was concerned. It was no uncommon thing to have 8 and 12 per cent. of sulphur left in the calcined cinders, and when the contents of the kiln had fused it required the work of two or three laborers for several days to remove the contents. A large amount of sulphur was also lost in the form of pure sulphur, and it took several days to start a kiln thoroughly, before it would give off gases containing any thing like a reasonable quantity of sulphurous acid gas.

There is no doubt that sulphurous acid may be made in great volume by this method, and the pyrites can be thoroughly calcined, provided that the kiln is very carefully watched and properly handled; but when a large number of them are under the charge of one man, they are very apt to go out of order.

It was also found that in order to keep the gases distinctly acid at all times, a very much larger number would have been required.

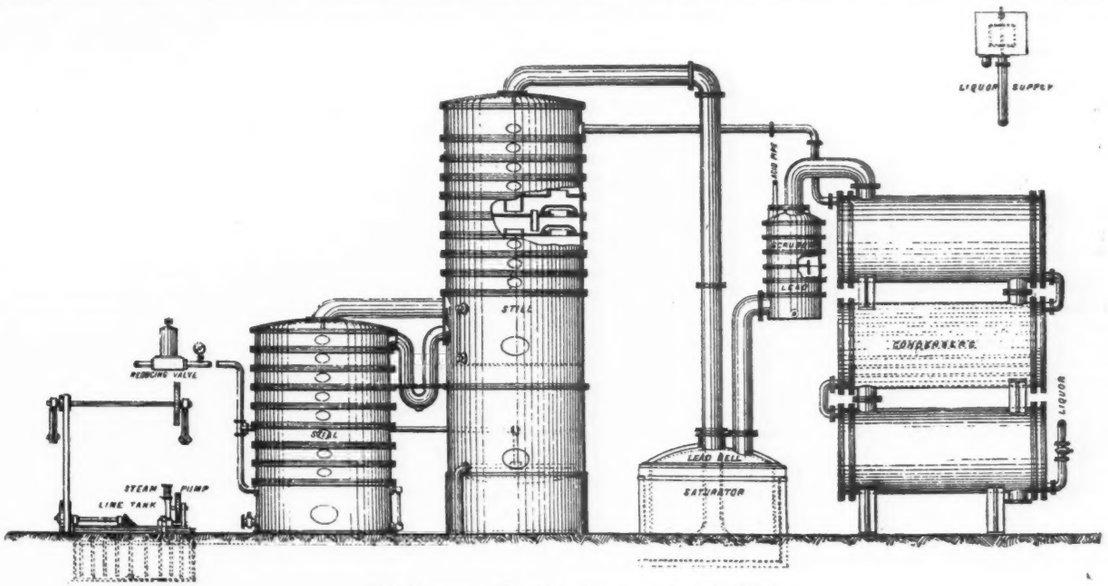
The author suggested the fusion of the mineral in a common blast-furnace, with sufficient silica in the form of sandstone to form an easily fusible cinder, having derived the idea from an exhaustive paper by Hollway* on the desulphurization of minerals in the Bessemer converter. This, on experiment, was found to be the cheapest and simplest method for the production of sulphurous acid gas, and is the process now in use.

One of the boiler kilns was, therefore, fitted up like a small blast-furnace and the pyrites desulphurized in it. The blast pressure used s about five pounds, and the air is heated in a small iron pipe stove to 900 to 1000 degrees F. Seven or eight tons of this carbonaceous ironstone are desulphurized every twelve hours. Practically one half of the sulphur is evolved in the free state, and to effect the conversion of this free sulphur into sulphurous acid, the 24 inch pipe lined with fire-brick leading away the gases at the top of the furnace is connected with five one inch pipes, which are placed at various distances along the sulphurous acid main pipe. Air at five pounds pressure is mixed with the gases at these points in order to burn the free sulphur. The sulphurous acid gas thus becomes nearly red hot, and as there is a possible danger of destroying the ammonia with such highly heated gases entering among the furnace gases, and as it is adding to their temperature, the 24 inch main is connected with 45 feet of a 16 inch malleable iron pipe lying in a water trough. This, however, is at times insufficient to cool the gases down to 700 degrees F. and the system of burning the free sulphur in the gases is, in the author's opinion, inefficient.

With gases containing carbonic oxide, hydrocarbons and free sulphur, it is no easy matter to convert the whole of the sulphur into the state of oxide, unless a considerable excess of oxygen is used, and the gases are given a prolonged travel. A mere run through 40 or 50 feet of piping is altogether insufficient.

The furnace has to be relined every month, and a furnace in blast can be run down, cooled, cleaned out, relined, and be again in blast in 12 hours.

It has been found at these works that the scrubbing towers erected are too narrow, and that a considerable quantity of liquor was carried over from the first into the second tower. The tars at these works are at present not worked up into oils and pitch, but are simply washed, and put into traveling tanks and carried to a neighboring disused pit, into which it is run. One would think that it would pay to burn them at



Feldtmann Patent Ammoniacal Still

(Most Modern Form).

* Society of Arts, February, 1879. In a paper such as this the author is unable to give a detailed account of his experience of the desulphurizing of minerals in blast-furnaces.

the boiler fires, but this is not the case, as they contain from 50 to 70 per cent of water, which can not very well be separated mechanically. Under these conditions, it was therefore economical to collect as little tar as possible in the scrubbing towers, and prevent as little liquor as possible being carried into the second tower. To effect this, the diaphrams in the top half of the first tower were taken out, and the liquor discharge pipe from the pump, instead of discharging at the top of the tower, is now discharging at 30 feet down from the top.

Sulphite of ammonia being a very soluble salt is easily washed out, and the great spraying of the washing liquor and the consequent carrying forward of the same by the onward pressure of gas is thus avoided. Only about 15 or 20 per cent of the tar is thus collected, the remainder going on as vapor, to be burned at the boiler fires, etc.

The speed of the circulating pumps has also been reduced to nine or ten strokes per minute.

Practically no tar is collected in the second scrubber, and any liquor or water that may be carried over is returned to the first.

An ordinary Schiele fan was at one time used for drawing the gases through the apparatus. The ordinary design of Schiele fan for this purpose is faulty, as the narrow entrances for the gases get choked up. It has been found that, with the open narrow style of scrubber used at Langloan, that the process can be carried out without a fan, and without producing any practical increase in the back pressure on the furnaces, and its use has therefore been discontinued.

It was the original intention of the firm to oxidize the sulphides and hyposulphides of ammonia into sulphates with air and boil down the resulting solution for the finished sulphate crystals.

Oxidation of these salts with air on the large scale is utterly impracticable.

While working at the subject the author discovered that the salts of ammonia in solution in these liquors under heat and pressure at 300 degrees to 380 degrees F. are easily and completely split up into free sulphur and sulphate of ammonia.

This he carried in a small boiler, all that was necessary being to charge the liquor and bring up the pressure to 200 pounds to the square inch.

Under this treatment the pale yellow sulphite of ammonia liquor was changed to an inky violet color, due to the decomposition of some of the traces of organic coloring bodies present in the liquor. This was got rid of by the addition of sulphuric acid. The Messrs. Addie patented this process.

About this time the price of sulphuric acid fell in Scotland to 28 to 30 shillings per ton of pyrites vitriol of 144 degrees Twaddell, and it was thought by them advisable in the mean time to distil the liquor with lime and treat the evolved ammonia gas with lime in the usual way. About 2500 gallons of the liquor at 12 degrees Twaddell is charged into a boiler, mixed with excess of lime in the form of milk of lime, and the ammonia distilled off by heat and injected steam. The pumping of these liquors to the top of a tower and there treating them to superheated steam, has been abandoned, owing to the great tendency of the mixed lime and liquor to froth over.

This constitutes an admirable method of distilling ammonia liquors where the ammonia exists in the free state or in the state of carbonate; but experience has shown that it is unsuited for the distillation of fixed salts of ammonia with lime.

The tower is being used at present as a trap in case of a "boil over" of the still. About one ton of lime shells is used to each ton of finished sulphate crystals. With the gases of three furnaces in good order the present make of ammonia at Langloan is 50 tons per month.

In the consideration of a process for the recovery of tar and ammonia from the gases of a furnace fed with raw coal, many points must be taken into consideration.

Wherever there is a good local market, with good prices, for oils and pitch, where every pound of gas is wanted for heating purposes, where there is plenty of water, and last but not least, plenty of capital, the process of condensation should be adopted.

In places where tars are of no value, where there is a superfluity of gas and where vitriol is cheap, some process of hot washing should be adopted.

The scrubbing of the gases with sulphuric acid is undoubtedly the cheapest method of recovering ammonia from blast-furnace gases, and with the advantage of the recent accumulated experience, plant on this principle could be erected for a trifling cost in comparison with the system of condensation. On the other hand, in districts where rich pyrites could be obtained, and the principle of forming a sulphate of ammonia (and decomposing this into sulphate by heat and pressure) was adopted, sulphate of ammonia could be made much cheaper than even by direct scrubbing with dilute sulphuric acid.

Extraction of Gold by Calcium Chloride.—The *Jernkontorets Annaler*, 1887, page 127, says: The ore is roasted if necessary and ground to a fine powder, together with a little salt. This mixture is roasted in reverberatory furnaces until the sulphides, arsenides, and antimonides are decomposed. It is then teemed into wooden tubs and treated with hot water, to wash out the copper and silver salts and oxides. The mass is then treated with a solution of ·006 to ·007 of calcium chloride in water, mixed with an equal volume of hydrochloric acid of 1·002 to 1·008 density, until a sample of the solution gives no gold reaction when tested with an acidulated solution of stannic chloride. The solution containing the gold is heated in wooden bowls by steam to a temperature of 160 degrees Fah., and precipitated by means of ferrous sulphate, sodium sulphide or sulphurous acid, a small quantity of plumbum acetate being added during the precipitation to insure all the gold being thrown down. This process has been employed at the Falee Copper-Works, in Sweden, since 1885, for the treatment of tailings from 29,000 tons of copper ore, together with 1500 tons of gold ore. In 1886 the tailings from 14,000 tons of copper ore contained 41·82 grains of gold per ton before treatment, and 4·04 grains of gold per ton after treatment, the cost per ton being: Calcium chloride, 6·6 pounds, 5d.; sulphuric acid, 8·37 pounds, 1d.; lead acetate and reagents, ½d.; fuel for steam, 1½d.; labor, 1d; total, 9d. In the same year 960 tons of gold ore contained 523·62 grains of gold per ton, and after treatment 6·02 grains per ton, the cost per ton being 12s, 2½d.

The New Alloy of Copper and Silicium is said to be as good as gold for all purposes of ornamentation and better for many other purposes. According to the proportion of silicium in the mixture, the alloy is malleable both when heated and at ordinary temperatures. It is described as having the color of virgin gold.

Long Engine Runs.—A Westinghouse engine which has been especially designed to make long runs, some time ago ran eleven months without stopping, at a speed of 300 revolutions. A still more remarkable record, however, has recently been made in the Pittsburg Gas Light Works, where a 10 horse-power Westinghouse engine has run continuously for thirteen months, running at about 500 revolutions per minute, and in that time making 233,000,000 revolutions without the throttle valve being shut, and is still running.

A Gigantic Ichthyosaurus.—Geologists are much interested in a discovery near Yeovil, in South Somersetshire, of a truly magnificent fossil of an ichthyosaurus 22 feet in length, with a jaw of three feet, furnished with large conical teeth. It fell to pieces when the surrounding clay was loosened, but can be restored. What is notable about the find is that all previous English specimens of this fish reptile were found in seacliffs in Dorset, whereas this was excavated about midway between the Bristol and English Channels, 25 miles from either.

A New Alloy.—Messrs. Vivian & Sons, Swansea, are introducing a new alloy, which they have styled ferrobronze, said to be suitable for forgings, rolling, bearings, etc. It is claimed for the new metal that with it can be produced bearings of a hardness, density, and strength equal to compressed steel. All kinds of forgings can be made from it, and on account of its cheapness, strength, and resistance to salt water it is strongly recommended by the makers for propellers for ocean-going steamers. The metal, which has been subjected to some very severe tests, is said to have been highly approved by experts.

The Greatest Waterfalls.—A correspondent calls our attention to the fact that the list of waterfalls given on page 344, ENGINEERING AND MINING JOURNAL, does not contain several falls in this country that are much higher than any there mentioned, and he cites from the report of the United States Geological Survey the following falls in the Yosemite Valley, California: The Ribbon Falls, 3300 feet in hight; Sentinel Fall, 3270 feet; Royal Arch Fall, 2000 feet; Yosemite (three falls, 1600, 533, 500), total, 2634 feet; Bridal Veil, 940 feet; Nevada, 700 feet; South Fork, 500 feet. The first three mentioned flow only in the spring and early summer, but the others are quite full all the year round.

New Law Concerning Mining Locations.—The bill which has passed the Senate, after prescribing the method of locating mining claims, provides an amendment to Section 2325 of the Revised Statutes, that no more than 3000 feet in length along a vein of claims located prior to May 10, 1872, and not more than one claim located after said date, shall be included in the same application for a patent, and not more than 160 acres of placer ground shall be included in an application for a patent. It is provided as a condition of sale that each patent shall reserve the right of way through and over any mining claim for roads, cuts, ditches, canals and tunnels for the purpose of working other mines, provided that any damages occasioned thereby shall be assessed and paid in the manner prescribed by the laws of the State or Territory in which such mine is situated, for the assessment and payment for land taken up for public uses under the right of eminent domain. The rights reserved under the provisions of this section in patents heretofore issued shall be regulated and made available as herein prescribed. It is also provided in the bill that upon claims already located previous to March 1st in any year, the annual work shall be performed on such claim prior to noon of August 1st, instead of January 2d, as is now the law.

Kerkook Petroleum Springs, Asia Minor.—On the eastern side of the Tigris, in the neighborhood of Kerkook, are numerous petroleum and naphtha springs which furnish employment for many of its people. The most abundant supply is obtained from the hills around, but a good deal is collected on the surface of the water in the ditches and stagnant pools. Some years ago this petroleum was largely used in Bagdad and Bussorah, but as the natives do not understand how to refine it properly, it has of late years been superseded by Russian and American oil. If the proper scientific methods were used in refining it, it is probable that the oil from this region might become of great commercial importance, as it is inexhaustible in quantity, and even without a railroad transportation is easy by way of the Tigris and Persian Gulf to Bagdad, Bussorah, India and beyond. There is, it is said, no limit to the supply which might be procured from the hills about Kerkook and Arbela. These hills have been yielding bitumen and petroleum since the time of Alexander the Great, at least, in whose honor Arbela was illuminated after his great victory over the Persians. The petroleum springs from almost every hollow in the hills. As it rises from the earth it is of a brownish color with a greenish tinge. It quickly becomes opaque and hard, in which state it is easily broken with a shining resinous fracture. The natives use it for fuel to burn limestone and also to cover boats with. The boats which are covered with this substance look as if they were covered with a thick hide. Mr. Grattan Geary, thus describes the principal spring, a funnel-shaped hollow ten or twelve yards in diameter: "The hollow is filled with a dark blackish brown substance, from the center of which salt water bubbles up and escapes to some salt ponds, where evaporating, its saline matter is left behind. Sometimes the water rises at intervals from the center in jets a foot and a half high and at others it bursts out in a considerable volume, raising the petroleum into huge bubbles, which burst and let the imprisoned water out with a gurgling noise. The pit is very deep in the center, but its shallowness at the edges permits the people to stand in it up to their knees, while they with facility roll up the tenacious substance into masses which are carried away and placed to dry in the heat of the sun. When hardened it is used chiefly for fuel for the burning of limestone. The flames give a strong light and heat, and it leaves a small earthy residue after it is burned. Notwithstanding the quantity that is constantly drawn off, the petroleum always continues at the same level, and the Hittitites say the supply in the pit is inexhaustible. The fluid skimmed off the water in the ditches and marshy places in the neighborhood of Kerkook is of a blackish green color and smells abominably."

THE BLEICHERT SYSTEM OF WIRE ROPE TRAMWAYS.

In the ENGINEERING AND MINING JOURNAL, March 31st, we called attention to the progress which has been made in recent years in transportation by aerial cable roads in Europe, and we pointed out the immense advantages that have followed the use of a heavy fixed rope with a light drawing rope, and the higher class of work put into the line generally, permitting of long spans (sometimes up to 1500 feet), of heavier individual loads (sometimes exceeding 2000 lbs.), and of increased speed and capacity. We cited the case of one of the Saarbrücken coal mines, where 1000 tons a day is carried a distance of four miles at a cost of only $\frac{6}{10}$ cent per ton-mile.

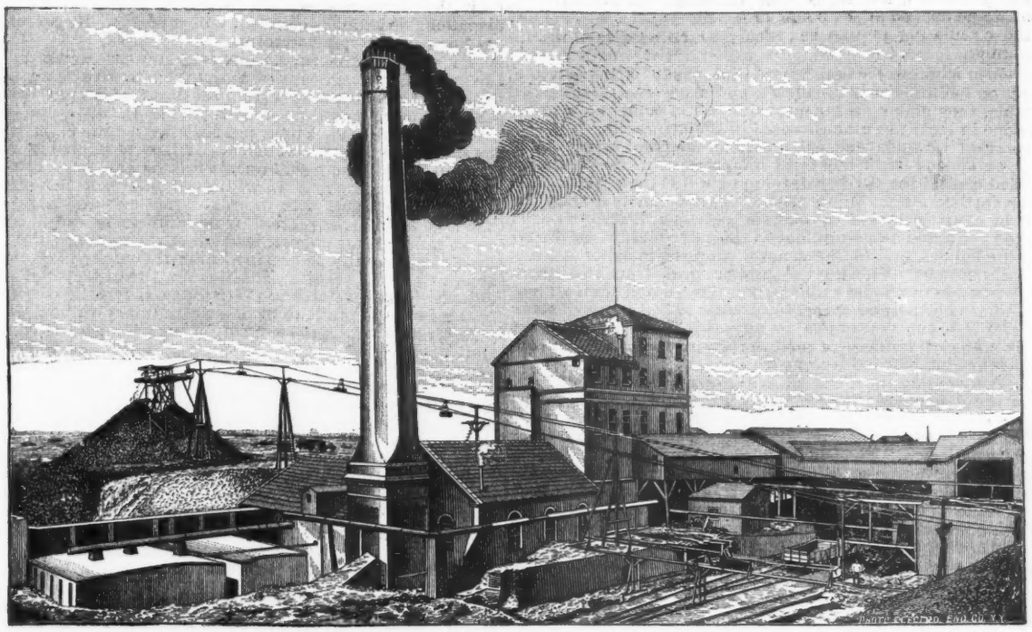
The numerous inquiries which followed the publication of that article evidenced the wide interest the subject possesses to our engineers and mine owners.

It is scarcely necessary to point out the immense economy such a system would effect over the "burro train" of our mountain districts, or even over surface railroads in places where heavy snows or tropical rains so frequently interrupt traffic, or where mountains and gorges make the building of surface roads extra expensive.

The most substantial improvement made in aerial transportation in Europe has unquestionably been by the introduction of the Bleichert system, and we are very pleased to be able to announce that the patents for this country have fallen into such excellent hands as Messrs. Cooper, Hewitt & Co., of this city, and that the technical management is in charge of so experienced an engineer as Mr. E. Gybbon Spillsbury.

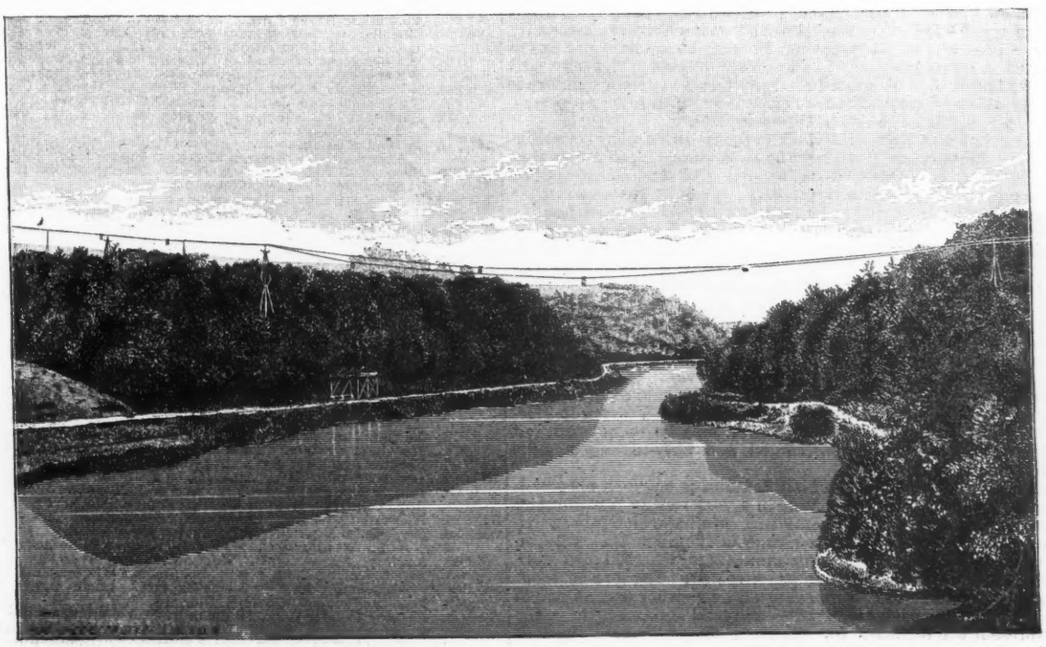
A pamphlet has been issued describing the system and giving much useful information which it is unnecessary to repeat here. The accompanying illustrations from photographs of lines actually working will show many of the engineering details and give an idea of its advantages.

Under the Bleichert system any grade can be overcome and the size of the supporting rope may be regulated to the length of span and load the different parts have to bear. An important consideration in using wire rope tramways, is that the load can be delivered exactly where it is wanted, avoiding the rehandling which is generally required in the case of surface roads. Without entering into any detailed description of the advantages offered by these aerial roads, we simply refer the reader who desires this fuller information to the manufacturers, whose address will be found in our advertising pages.



View of the "Mansfeld" Colliery Tramway (Bleichert System), used for Carrying away Slate from Coal Washers.

(From a Photograph.)



View of the "Weilburg" Tramway (Bleichert System), 1000-foot Span over the Weinbach Valley. Length of Line, Seven Miles; Daily Capacity, 250 Tons.

(From a Photograph.)

MINING IN ARIZONA.

Written for the Engineering and Mining Journal, by Alex. Trippel, M.E.

Having recently visited a number of mining districts in Arizona, I thought that a brief summary of my observations might not prove wholly uninteresting to the readers of the ENGINEERING AND MINING JOURNAL.

The general mining results of the territory for the past year do not differ essentially from those of the preceding twelve months; in other words, there was no substantial increase of production either of the precious metals or of copper and lead. The principal reason is attributable to the continued depreciation in the price of metals, which more or less crippled some mining ventures, reduced profits in others, and discouraged the investment of capital in new enterprises. The effect of this was naturally more severely felt in a country where varied and cheap transportation, extensive reduction facilities near the mines, and cheap fuel were needed but not obtainable, thus making it far more difficult to combat low prices than could be done in localities more favored in these respects.

Another important obstacle consisted in the fact that many mine owners having exhausted their means in comparatively cheap surface work, now needed capital for further development of their properties, and this was not forthcoming. While these embarrassments greatly retarded progress by causing so close a margin between profit and loss, they at the same time acted as a stimulant to the introduction of better machinery and appliances, and to the general improvement of mining and metallurgical methods. Viewing the present status from this standpoint, Arizona has made rapid and important progress, and with a great number of new mines opened and others further developed (some of them upon a large scale), it is but reasonable to expect that the present year will show a very material increase of metal production, not only in copper but in the precious metals and lead as well.

As a matter of course the copper output will be more than doubled. The workings of the Arizona Mining Company at Clifton and the Copper Queen Mining Company at Bisbee are upon a large scale, the former including a railroad already built and the later a small railroad from Fairbanks, in contemplation. The Old Dominion Company, of Globe, has recently started two furnaces, although no new or larger plant is spoken of as yet. Besides, it is more than probable that sundry other good copper properties in Gila and Pinal counties will be worked shortly, these counties being especially rich in cupriferous deposits. The plan of consolidating many properties under the same ownership and management is evidently the intention of the Bisbee and Clifton companies, it being the only one which permits taking advantage of the facilities offered by large plants.

Argentiferous and auriferous copper ores occur in Yavapai County—the latter particularly in Yuma County, where excellent copper ore is found, assaying from $60 to $300 per ton in gold, with some silver. The mines of these counties, with the exception of the United Verde group, can hardly be said to be fairly prospected.

The silver industry, particularly, has made substantial progress. It is well understood now that permanent profits do not, as a rule, originate from rich temporary "strikes;" but, on the contrary, generally from low grade ores, averaging between 20 and 35 ounces per ton in silver, extracted in large quantities from powerful veins or deposits, and cheaply mined, handled, and metallurgically treated. Very rich ore is found in nearly all the counties; but, as elsewhere, with few exceptions, such ore is not present in large or lasting quantities.

A material assistance to close mill-work is the frequent use of concentrators, without which, it can truthfully be said, many large mines that are now in operation could not work at all. Concentration applied directly to the ore, or indirectly to the tailings, is to-day recognized as a most important factor in success. The results of milling without it would be wasteful and unsatisfactory.

The introduction of the "Boss" milling process has also proved of great value and benefit.

Roasting is attempted in but few mills; but where it is employed, as in the Silver King mill, it is done with great skill and economy. Arizona can be justly proud of the records made by several of her larger silver mills, wherein the work is accomplished at a cost ranging from $5 to $9.65 per ton (the latter figure including roasting and chloridizing), and where the final product so nearly reaches the assay value of the ore.

The territory has but few mining or metallurgical plants of great magnitude. Among these the Grand Central in Cochise, the Vulture in Maricopa, and the Silver King in Pinal counties, may be mentioned, but there are numbers of smaller well-constructed and ably-managed mills in many localities.

A new field for silver mining, for which Arizona is not well prepared, is the production of silver-lead ores. Within a very recent period many extensive and valuable ledges of such smelting ores have either been discovered, or more intelligently prospected, especially in Pima County, in the Tucson, Santa Rita, and Patagonian mountains, where, I am convinced, immense masses of such ore can be extracted. The ore is moderate in grade, *i. e.*, from 15 to 40 ounces silver, and either carries ample fluxing qualities, or the necessary fluxing material is procurable in the vicinity. At present the facilities for smelting are extremely limited. The few works specially built for custom ores do not seem to be popular and are too distant and inaccessible for wagon transportation, so that the better class of ore in consequence is shipped to eastern works, such as those at Socorro and El Paso, for reduction, leaving the lower grade ore unavailable. Although the railroad freight rates have been reduced they are still too high, and the transportation charges to the railroad too expensive to leave much, if any, profit to the miner.

The sampling-works, recently established at Tucson and Prescott, have aided to mitigate this embarrassment by offering at least speedy settlements to owners; but the want of several centrally located smelting-works is apparent enough. The expected resumption of work in many silver mines of Cochise, Pinal, Pima, and Yavapai counties will increase the bullion product greatly this year.

An obstacle of importance is the water question in Tombstone. Without active co-operation progress in the famous mines of this well-known town will be much retarded; nearly all the work done at present being necessarily above the water level; meanwhile many smaller mines are bought up and consolidated with the Grand Central.

Gold mining in Arizona has not been very progressive lately, but is about upon a par compared with the past few years. Enough, however, has been accomplished to show that gold ore assaying less than $5 per ton can be profitably worked on a large scale. The Vulture, in Maricopa County, with its eighty-foot vein, is so well known that comment is unnecessary. The Mammoth, in Pinal County, is another such property, with a 10 to 20-foot vein, assaying from $9 to $15 per ton in gold. It is very remarkable that in these large mines concentration has been applied in one mill only quite recently, with a daily saving of two tons concentrates, assaying $270 per ton, while the other mine is now idle and awaiting general reconstruction, including the introduction of several Frue vanners, which, it is claimed, will save 40 to 50 per cent gold, reported as having been lost heretofore.

There are, at this time, numerous gold producing mines in Pinal, Yavapai and Maricopa counties, a part from those already mentioned; but the gold field or belt running from southeast of Pinal County, northwesterly through Maricopa, the southern part of Yavapai, and thence to the Colorado River through Yuma and Mohave counties, is immense, and may be said to be simply scratched. There is probably no section in the United States where gold-quartz mining can be more profitably prosecuted in a large way than within the gold belt just described, provided that modern plants with improved methods and labor-saving machinery are used as in other places. Gold mining is not nearly so dependent upon railroads as copper, lead or silver mining; the bulk of material used can generally be obtained near the mines; but, assuming that Arizona will shortly possess additional railroad facilities such as are now enjoyed by other states and territories, it is not too much to say that her gold mines will prove to be of extraordinary value and importance.

As already stated, the working of the gold-bearing copper ores of Yuma, and, I believe, of Mohave counties are, practically speaking, a new departure which will, sooner or later, be a prolific source of gold production.

Arizona sadly needs a system of easy and cheap communication by rail to the chief centers of mining activity, such as we see elsewhere, notably in Colorado. This will be the first grand step toward the development of her mineral resources, which are inferior to those of no other State or Territory, when averages are considered.

With her genial climate, her rapidly growing agricultural interests, the bugbear of savagery by Indians or lawless whites dispelled, and her vast mineral wealth awaiting the magic touch of capital, intelligence, and muscle, Arizona's future is more than brilliant.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

PATENTS GRANTED MAY 15TH, 1888.

382,689. Apparatus for Sinking Wells. Matthew T. Chapman, Aurora, Ill.
382,701. Combined Concentrator and Amalgamator. W M Hartman, Denver, Colo.
382,704. Appliance for Rolls. William R. Jones, Braddock, Pa.
382,714. Switch for Electric Motors. Richard H. Mather, Windsor, Conn.
382,715. Switching Device for Electric Motors. Richard H. Mather, Windsor, Conn.
382,725. Machine for Turning Axle Ends. Andrew Patterson, McKeesport, Pa., Assignor to the National Tube Works Company, same place.
382,726. Locking Device for Cable Splices. William R. Patterson, Chicago, Ill., Assignor to the Western Electric Company, same place.
382,727. Pneumatic Water Elevator. Thomas O. Perry, Tecumseh, Mich.
382,729. Machine for Drawing Rods and Tubes. Carl M. Pielsticker, London, Eng.
382,732. Indicator for Boiler-Feeds. William H. Rodgers, Whitestone, N. Y.
382,748. Scale-Preventer for Boilers. Charles F. Baker, Minneapolis, Minn.
382,752. Lubricator. Gilman W. Brown, West Newbury, Mass.
382,753. Feed-Pipe for Boilers. Samuel W. Bryar, Pittsburg, Pa.
382,760. Air-Compressor. James B. Erwin, Milwaukee, Wis.
382,765. Shaft-Coupling. George H. Mackay, Salem, N. H., Assignor of one half to Orlando Woodbury, same place.
382,768. Method of Manufacturing Electric Cables. William R. Patterson, Chicago, Ill., Assignor to the Western Electric Company, same place.
382,782. Suspended Tramway. Charles H. Thompson, Bartow, Fla., Assignor to Alexander E. Brown, Cleveland, Ohio.
382,792. Apparatus for Detecting Leakage in Furnace-Blocks. Jos. Bird, Saxton, Pa.
382,826 and 382,827. Alloy. Heinrich Ostermann and Axel Prip, Geneva, Switzerland.
382,833. Ore-Concentrator. Charles C. Rueger, Anaconda, Mont.
382,857. Traction-Engine. Frank Batter, Slide, Cal.
382,866. Method of Manufacturing Brick. James F. Clark, Morenci, Mich.
382,876 and 382,877. Electric Railway. Rudolph M. Hunter, Philadelphia, Pa., Assignor to the Electric Car Company of America, same place.
382,887. Construction of Water-Wheels with movable Floats or Paddles. Jules François Lefort, Paris, France.
382,893. Journal-Box. John C. Miller, Springfield, Ohio, Assignor to the Thomas Manufacturing Company, same place.
382,895. Rock-Drill William O'Keefe, Elliston, Mont.
382,914. Electric Indicator. John Tregoning, Hartford, Conn.
382,915. Lubricator. Etienne Verney, Réaumont, France.
382,932. Governor for Steam-Engines. James B. Allfree, Indianapolis, Ind., Assignor of one half to Robert Shriver and Harrison Swartzwelder, Cumberland, Md.
382,946. Apparatus for Handling Material. Alexander E. Brown, Cleveland, Ohio.
382,973. Machine for Disintegrating Bituminous Substances. Elias Groat, San Fran., Cal
382,974. Machine for Making Cement Pipes Leo G. Hasse, Oak Park, Ill.
383,000. Feeding Appliance for Rolling-Mills. Joseph Morgan, Jr., Johnstown, Pa.
383,001. Grooved Girder-Rail. Arthur J. Moxham, Johnstown, Pa.
383,002. Double-Grooved Girder-Rail. Arthur J. Moxham, Johnstown, Pa.
383,025. Apparatus for Operating Oil-Well Pumps. Cochran C. Stover, Bradford, Pa.
383,028. Hydraulic Air-Pump. Edward H Weatherhead, Cleveland, Ohio.
383,030. Machine for Heating and Hardening Metal Articles. Harvey White, Syracuse, N. Y., Assignor to the Whitman & Barnes Manufacturing Co., of Ohio.
383,039. Molding Viscous Metals. Walter Burnham, Hyde Park, Ill.
383,043. Art of Heading Nails, Tacks, etc. George W. Copeland, Malden, Mass.
383,044. Fly-Wheel Governor for Steam-Engines. Lucius D. Copeland, Camden, N. J.
383,047. Forging-Machine. David H. Downess, Pullman, Ill.
383,056. Housing Cap for Rolls. William R. Jones, Braddock, Pa.
383,060. Mold for Casting Metal. Sylvanus D. Locke, Hoosick Falls, N. Y., Assignor of one half to the McCormick Harvesting Machine Company, Chicago, Ill.
383,061. Mining-Machine. Frank Lowry, Columbus, Ohio, Assignor to the Lechner Manufacturing Company, same place.
383,063. Rock-Drilling Machine. Thomas J. Murphy, New York, N. Y., Assignor of one half to Roger Potter, same place.
383,064. Tripod for Rock-Drilling Machines. Thomas J. Murphy, New York, N. Y., Assignor of one half to Roger Potter, same place.
383,065. Motor-Engine Worked by Combustible Gas. Nicolaus A. Otto, Cologne, Prussia, Assignor to the Gas Motoren Fabrik Deutz, Deutz on the Rhine, Germany.
383,081. Die for Shaping Sheet Metal. Orrin W. Swift, New Haven, Conn.
383,083. Bolt-Heading Machine. William N. Whiteley, Oscar E. Perrigo and Albert S. Perrigo, Springfield, Ohio, Assignor to said William N. Whiteley.
383,084. Machine for Forming Eyes on Rods. Charles O. Wilder, South Bend, Ind., Assignor to Williams, White & Co., Moline, Ill.
383,087. Delivering and Stretching Mechanism for Machines for the Manufacture of Wire Rope. James Withington, Chambersburg, Assignor to the Trenton Iron Company, Trenton, N. J.
383,088. Vertical Wire-Rope Closing Machine. James Withington, Chambersburg, Assignor to the Trenton Iron Company, Trenton, N. J.
383,089. Automatic Stationary Water-Filter. William Witthoeft, Jr., St. Louis, Mo., Assignor of one third to Louis F. Boeckstiegel, same place.

RE-ISSUE.

10,932. Machine for Reducing Metal Rods. Henry A. Williams, Taunton, Mass., Assignor to the H. A. Williams Manufacturing Company, same place.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(*Continued from page* 327.)

If, however, by the formation of a large blister our carbonic oxide accumulates and has but a relatively small surface of iron exposed to it while the metal is cooling, it is easy to see that much or most of it might escape decomposition, and be found as such when the cold blister is bored under water.[a] When our metal is again heated in vacuo we may suppose that the oxygen and carbon which had previously been dissociated recombine, and we find carbonic oxide in our vacuum gases. This view harmonizes with the fact stated by Wedding in this connection,[b] that the cavities in puddled balls, at least after long exposure to the air, are free from carbonic oxide, though doubtless formed in large part by that gas. In either view carbonic oxide is gasified during solidification, along with hydrogen and nitrogen, and coöperates with them to form blowholes.

§ 218. SOURCE OF THE HYDROGEN AND NITROGEN OF THE BORING GASES.

Attempts have been made, by two different lines of argument, to show that the hydrogen and nitrogen of which the boring gases consist are not the causes of blowholes. Neither of these bear scrutiny. We will now consider them separately.

1. It has been argued that the boring gases do not proceed from the blowholes, but from the decomposition of the water in which the boring occurs. This superficially attractive theory received powerful but ephemeral support from E. W. Richards' statement[c] that, on attacking a steel ingot with a dull drill, enormous quantities of hydrogen were evolved, "although no steel had been cut away, showing clearly that the hydrogen was obtained by the decomposition of the water." But he appears to have been misinformed, for Müller flatly contradicts him, and states that 1·5 cubic inches of steel were cut away.[d] This contradiction remains unchallenged as far as I know, and destroys the only important support of this theory.[e]

This instance (Number 17, Table 54), really points to the metal, not the water as the source of the boring gases. For it shows that when we finely triturate our metal and thus lay bare numberless minute pores, we release vastly more gas than when we simply turn comparatively thick shavings, in this case over fifty times as much. In this case the dull drill released gas still consisting of hydrogen and nitrogen in normal proportions, though differing somewhat from those found by the sharp drill, which might easily happen were different portions of the ingot attacked by the two drills. But in another instance a specimen of cast-iron was drilled *A* with a sharp and *B* with a dull drill: though the latter released eight times as much gas per volume of metal as the former, the composition of the gas was alike in the two cases. This would be natural if the gas arose from the metal, but if it arose from the decomposition of the water, the proportion of nitrogen should be less with the dull drill. For, as the nitrogen found must, in this view, have been previously dissolved in the water, and as only a limited amount could be so dissolved, if our drill released it from solution it would be almost pumping against a vacuum, and the proportion of nitrogen should rapidly diminish; actually it increased. It is possible that a little previously dissolved nitrogen might be derived from the water, though it should be very little, as in some of Müller's experiments the water had been freshly boiled. But it is extremely improbable that the volume of nitrogen thus acquired would increase proportionally to the hydrogen. Nor do we lack further evidence that the gas did not come from the water.

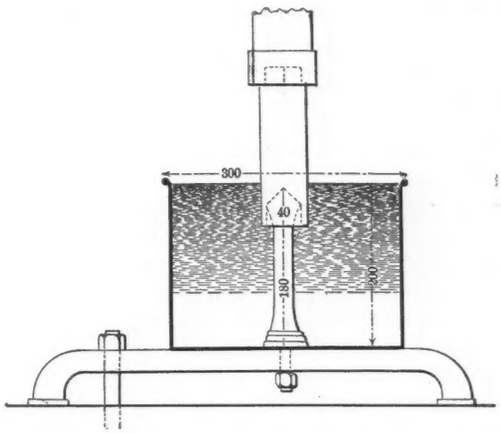


Fig. 16.—Müller's Boring Apparatus, for Obtaining the Gases from the Blowholes, etc., of Cold Metal.

A. Steel bored under oil yielded gas similar in composition and quantity to that obtained in boring under water. (No. 2, Table 54.) An ingot bored under mercury yielded gas composed as usual chiefly of hydrogen. The quantity obtained was indeed small: but this is not surprising, for Müller found that the quantity of gas obtained in boring under water was in some cases fifteen times as large as in others.

D. If the gas came from the decomposition of water, solid steel, offering more frictional resistance, should yield more gas per cubic inch cut than porous steel: if from the pores, porous steel should yield the most. Actually it yields on an average nearly four times as much gas as solid steel. (See Table 73.)

E. If the gas came from the water, where is the one part of oxygen which it should contain for every two of hydro-

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[a] See reference to numbers 33, 34, Table 54.

[b] Stahl und Eisen, III., p. 200, 1883.

[c] Journ. Iron and St. Inst., 1882, II., p. 520.

[d] Iron, 1883, p. 115.

[e] It is true that Walrand (Van Nostrand's Eng. Mag., XXXIII., p. 361, 1885, from Jernkont. Ann.) states that on boring steel under oil and mercury he could not obtain a trace of gas, while on boring under water he always obtained gas, which he found detonated without the addition of air, and he believes that the theory which considers hydrogen as a source of blowholes has no more foundation than the old theory that nitrogen was the essential element of steel.

Such a negative result as his failure to obtain gas on boring under mercury and oil counts for little against the positive determinations which are recorded: it is surprising, but incomparably less so than his brushing aside the great mass of evidence, furnished in large part by most trustworthy observers, which demonstrates the presence of hydrogen in iron and its escape from it, and of which the composition of the boring gases, the only point assailed by him, forms but a single unessential, though indeed valuable, portion.

The fact that the gas which he obtained on boring under water would detonate implies that it contained oxygen. The presence of oxygen derived from some source other than the decomposition of the water is readily accounted for. The slightest error in manipulation would admit atmospheric oxygen: had the water in which the boring occurred not been freshly boiled, it might well yield up sufficient oxygen previously dissolved in it to cause detonation. But the complete absence of oxygen from the boring gases of such competent observers as Müller and Stead cannot be harmonized easily if at all with the belief that the hydrogen which they found came from the decomposition of water. Walrand supposes that the drill rotated so rapidly as to become magnetized, thus causing an electric current, which decomposed the water. Müller's drills were actually stationary, the ingot being slowly rotated. Two distinguished physicists inform me that the decomposition of water in this particular way under these conditions is not only extremely improbable but almost inconceivable. Indeed, I am inclined to think that Walrand must mean something quite different from what he says, which is certainly hard to understand.

gen? Where is the atmospheric oxygen which should have dissolved in the water along with the atmospheric nitrogen, and with it should have been released by the drill? In one case only is oxygen found, and then only 0·37% of it. To the suggestion that it has been consumed in oxidizing the iron, suffice it to reply that, in some of Müller's experiments, the metal was cut so slowly that it would not have grown hot enough to assume oxide tints if cut in free air:[a] that in the arrangement employed (Figure 16) ingot and drill were always cooled by contact with water: the supposed decomposition of water would have further lowered the temperature: a fortiori the metal must have been far too cold to take up even the uncombined oxygen of the air: how then could it rapidly decompose previously boiled water? Finally, the first portions of gas evolved would depress the surface of the water below the cutting grinding surfaces, where alone can the decomposition of water be even dreamed of.

F. As elsewhere stated, in certain cases the gas was under such pressure in the metal that it bubbled out from the borehole the moment that the drill reached the first blowholes. This is certainly the behavior of gas previously present in the blowholes and not of that recovered from the water.

G. The gas in the borehole was subjected to pressure above, not below, that of the atmosphere (cf. Figure 16): this would oppose the recovery of gas from the water, and would rather tend to cause the water to absorb the gas evolved by the metal.

The second line of reasoning by which it is attempted to show that hydrogen and nitrogen of the boring gases may not be the chief causes of blowholes, is offered provisionally by Wedding.[b] He suggests that carbonic oxide, formed by reaction in the solidifying metal, causes the blowholes: that it is converted into carbonic acid later on, I suppose by the reaction $2CO = C + CO_2$; that, after the blowholes have been formed, hydrogen and nitrogen enter them: that, on boring, the carbonic acid is absorbed by the water in which the ingot is immersed, so that hydrogen and nitrogen, though perhaps innocent, are alone found. It is sufficient to reply 1st, that though some carbonic oxide might be thus converted into carbonic acid, the reaction would never be complete, but would be arrested as soon as equilibrium was reached.[c d] 2d, that if it were converted into carbonic acid, much of this would be immediately reduced to carbonic oxide by the hot metal.[c e] 3d, that the water in which the ingot is drilled becomes warm, with corresponding decrease in its solvent power for carbonic acid.[f] 4th, that in boring blisters under water plenty of both carbonic oxide and carbonic acid are found, (33 and 34, Table 54) showing that the water by no means necessarily absorbs all our carbonic acid. 5th, that on boring under mercury and oil neither carbonic acid nor oxide is found. 6th, that it would be a gratuitous assumption, which really begs the whole question, to hold that the hydrogen and nitrogen which are evolved before and during solidification along with the carbonic oxide do not coöperate with it to form the blowholes. I know no reason to suspect even faintly that the evolution of hydrogen and nitrogen is temporarily suspended while carbonic oxide is forming the blowholes, to recommence when they have been formed.

§ 219. I have now pointed out that the hydrogen and nitrogen which clearly come from solution, not reaction, constitute a large part of the blowhole-forming gases; that the behavior of gases toward iron is so closely like their behavior towards other solvents as in itself to indicate that they dissolve, and that their blowhole-forming escape is in large part from previous solution: and that in checking the escape of gas silicon acts through the solvent power of the iron.

That blowholes are in large part formed by the escape of hydrogen and nitrogen from previous solution may then be regarded as well established. But carbonic oxide, though not found in the blowholes, probably coöperates with hydrogen and nitrogen in causing them. Though it involves some repetition let us now re-examine the evidence with a view to deciding whether this carbonic oxide, like the hydrogen and nitrogen, escapes from solution or is formed at the instant of its escape by the oxidation of carbon.

1. While the behavior of gases towards iron resembles their behavior to known solvents so closely as to indicate that they escape in large part from solution, it does not prove that they escape solely from solution. Further study may reveal discrepancies due to the escape of carbonic oxide from reaction.

2. The general resemblance of the behavior of carbonic oxide to that of hydrogen and nitrogen, its escaping simultaneously with these gases which surely come from solution, certainly strongly suggests that it too comes from solution. But while their escape is usually simultaneous, yet the relation between the proportion of carbonic oxide and that of these other gases varies so greatly with varying conditions, as to permit the belief that their escape may be due to different ulterior causes. The ratio of hydrogen to nitrogen in the gases obtained under different conditions indeed varies, but, with few exceptions, within much narrower limits than does the ratio of carbonic oxide to these gases: moreover, it is not shown that the latter variation may not be due to the solubility of the hydrogen group and the non-solubility of carbonic oxide. This consideration does not argue against the solubility of carbonic oxide, but it lessens the force of the argument of analogous behavior.

3. Next we have Bessemer's statement that raising and lowering the pressure completely stopped and accelerated the escape of apparently pure carbonic oxide from molten iron.[g] But there seems to be room for a difference of opinion as to whether the escaping gas was really pure carbonic oxide, and indeed whether more carbonic oxide was present than could be accounted for by the agitation due to the escape of hydrogen and nitrogen from solution.[g]

4. Again, the apparent absorption of carbonic oxide observed by Graham, Parry, and Troost and Hautefeuille[h]: the escape of gas noted by the latter observers when iron was solidified with fall of pressure after long tranquil fusion in an atmosphere of carbonic oxide[i]: and the

[a] Müller, Iron, February 9th, 1883, p. 115.
[b] Stahl und Eisen. III., p. 200, 1883.
[c] See § 182.
[d] Bell, Journ. Iron and St. Inst., 1871, I., pp. 140 to 143, 162, 184, Experiments 245, 252, 343, 344, and 254 to 263.
[e] Idem, pp. 109 to 111, Expts. 78-9. Manufacture of Iron and Steel, pp. 185-6.
[f] Müller, Stahl und Eisen, III., p. 445, 1883: Iron, Sept. 14, 1883, p. 244. At 65·6° C. water dissolves only about one fifteenth as much carbonic acid as at 0°. (Storer, Dict. Solubilities.)
[g] § 188 C.
[h] § 190.
[i] § 188 A.

greatly increased suddenness of escape of gas when iron was suddenly solidified in Brustlein's experiment,[a] all point to the escape of carbonic oxide from solution. But we do not know that it is carbonic oxide and not simply its dissociated elements that is absorbed by hot iron: and we have no analyses of the gas evolved on solidification in the experiments of Troost and Hautefeuille and of Brustlein to tell us that carbonic oxide was among the gases thus expelled.

5. Carbonic oxide escapes from iron in which a gas-forming reaction is improbable, both from oxygenated and hence nearly carbonless iron and from presumably oxygenless cast-iron.

In the latter case it is possible that the carbonic oxide arises from external oxidation.

In the case of afterblown basic metal it would indeed be improbable that all the gas escaping during solidification was carbonic oxide arising from reaction, for probably at least three volumes of gas then escape per volume of metal, which would imply the oxidation of 0·02% of carbon, or half that residue which the enormous excess of air of the afterblow had been powerless to remove.[b] But we do not know that the gas from afterblown basic steel contains any considerable proportion of carbonic oxide, as we have no analysis of it.

The gas from overblown acid Bessemer metal contains about 18% of carbonic oxide.[c]

The escape of three volumes of gas containing this proportion of carbonic oxide calls for the oxidation of 0·004% of carbon. We would hardly expect even this small quantity to be oxidized, especially as the relative affinity of carbon for oxygen probably falls with falling temperature: yet it is far from incredible that it should be.

In short, while the escape of carbonic oxide in these cases certainly suggests that this gas had been dissolved in the metal, it by no means proves it.

6. The fact that the blowholes in ice, clearly formed by gas escaping from solution, so closely resemble those in iron, strongly suggests, but does not prove, that the gases which form the latter also escape from previous solution: and carbonic oxide is probably one of these blowhole-forming gases.[d]

7. Next, the protracted and deferred escape of gas, including carbonic oxide, during solidification is truly far more suggestive of escape from previous solution than of deferred reaction: and indeed when the escape of gas from the molten metal has once ceased but begins again later, the latter source seems decidedly improbable: but, though no exactly similar case has been suggested, even the deferred reaction cannot be called impossible, and the protracted reaction can hardly be called even extremely improbable.[e]

8. Again, we have seen that the addition of silicon and manganese diminishes or even completely stops the evolution of gas, including carbonic oxide, even when but little of these elements is oxidized, and when a portion of the carbon added along with them appears to be oxidized, so that that which appears to stimulate the formation of carbonic oxide stops its escape.[f] Silicon and manganese here undoubtedly arrest the escape of hydrogen and nitrogen by increasing their solubility: but it is possible that they arrest the escape of carbonic oxide by being themselves oxidized and thus stopping its formation. For either silicon or manganese is oxidized to a slight extent in every case, and the proportion of carbon which appears to be oxidized is so minute that its disappearance may be due to experimental error. We have further seen that it is improbable on a priori grounds that silicon and manganese should have the power of preventing the oxidation of carbon under these conditions: but, though improbable, it is far from impossible.

The escape of carbonic oxide from solution and from immediately preceding reaction are, however, far from mutually exclusive.

Be it remembered that, even if we hold that carbonic oxide does dissolve, we must still admit that it may escape from immediately preceding reaction also. In this view the case considered in the last paragraph admits another explanation, to wit, that the carbonic oxide which was escaping before the recarburizer was added was being formed as it escaped by the oxidation of carbon, and that the silicon and manganese increased the metal's solvent power so that it was able to retain in solution not only the hydrogen, nitrogen and carbonic oxide which would have continued to escape had the recarburizer not been added, but also that carbonic oxide which is formed by the oxidation of a portion of the carbon of the recarburizer.

In this view the deferred escape of gas from molten metal may be explained comparatively simply. If the escape of carbonic oxide temporarily ceases after the spiegel reaction, we may suppose that, though this gas is constantly being generated by the union of the carbon and oxygen of the metal, yet with falling temperature (Figure 15) its solubility increases at first faster than the gas forms: hence its escape ceases. Later, its solubility perhaps increasing less rapidly, or indeed falling as the freezing point is reached, while its formation continues unabated, the metal again becomes supersaturated, and escape recommences.

Those who hold that the carbonic oxide escaping from iron is always generated by immediately preceding reaction, may go a step farther and claim that reaction is the sole ulterior cause of the escape of gas, both before and during solidification at least in certain cases: that it is the agitation or, if they prefer vagueness, the intermolecular disturbance due to the escape of nascent carbonic oxide that causes the hydrogen and nitrogen to escape; and that the carbonic oxide, the principal, which escapes during plasticity and with its accomplices, hydrogen and nitrogen, forms blowholes, is later decomposed by the hot metal, or reabsorbed, so that the accomplices alone are found on boring. But this does not bear the stamp of probability: indeed it seems almost impossible in many cases, *e. g.* in Bessemer's and Brustlein's experiments, and in the case of oxygenated and almost carbonless basic metal, from which great quantities of hydrogen and nitrogen escape on solidification, though but slight oxidation of carbon can occur, and though the violent agitation of the Bessemer process had failed to expel this hydrogen and nitrogen.

§ 220. RÉSUMÉ.—To sum this discussion up, very numerous analyses of the gases which iron evolves, before, during and after solidification, on boring and on heating in vacuo, prove that these gases usually consist chiefly of hydrogen and nitrogen, which, according to the definitions made in order to render discussion of the points at issue possible, must escape from solution.

But, wholly independently of this conclusive evidence, the behavior of gases towards iron, their absorption and release from both solid and molten metal on rise and fall

[a] § 202 E. [b] § 216. [c] 73–4, Table 55. [d] § 214, C. [e] § 214, B. [f] § 215, A.

of pressure, their expulsion on solidification and agitation, their protracted escape, and the shape and position of the cavities which they form, is closely analogous to their behavior towards other solvents. The closeness of this analogy; our inability to reconcile the copious escape of gas from iron rich in silicon with the complete arrest of the escape of gas by slight additions of this element on the reaction theory, and the complete accord of these phenomena with the solution theory; the fact that gases are copiously evolved from both oxygenless and nearly carbonless iron and from other classes in which no gas-forming reaction is to be looked for; and that their escape cannot be accounted for qualitatively or quantitatively by purely mechanical retention of insoluble gas, all point with varying degrees of certainty and, taken collectively, lead irresistibly to the conclusion that gases dissolve in iron, and that at least a very large part of the gases whose escape forms blowholes are dissolved in the metal before that escape.

If successful, the attempt to show that the hydrogen and nitrogen alone found on boring cold iron proceed from the water in which it is bored, not from the iron, would not seriously bear against the remaining evidence and reasoning. But the ratio of nitrogen to hydrogen in these gases and their freedom from oxygen: the fact that the gases obtained in the two instances in which iron has been bored under oil and mercury resembled in composition those obtained on boring under water: the fact that compact yields less gas than porous iron, and the arrangement of the boring apparatus, collectively argue cogently against the aqueous source of the gases. That the absence of carbonic oxide from these gases is not due to its conversion into carbonic acid and subsequent absorption by the boring water, is indicated by the facts that this conversion could not be complete, that neither carbonic oxide or acid is found on boring under oil and mercury, and that in case of blisters both these gases are found even on boring under water.

Further, the changes in the composition of the gases evolved from iron, so far as we have studied them, are quite compatible with the view that they are evolved from solution.

Turning now to carbonic oxide, which accompanies hydrogen and nitrogen in all except the boring gases, there is reason to believe that, in spite of its absence from the blowholes when the metal is cold, it coöperates in forming them while the metal is hot, and is later reabsorbed or decomposed. 1 the general similarity of its behavior to that of hydrogen and nitrogen; 2 its expulsion and absorption with falling and rising pressure; 3 its escape, occurring when no reaction is to be expected, and arrested by silicon when this element appears to act on the solubility and not by being preferentially oxidized: these three collectively very strongly indicate that carbonic oxide dissolves, and that its blowhole-forming escape is usually from previous solution. But it may reasonably be held that they do not prove it. Were carbonic oxide known to dissolve, then in coöperating with hydrogen and nitrogen in the formation of blowholes it would be most natural to suppose that, in the majority of cases, it escaped from solution like its companions.

In a word: it is practically certain that in the many and important classes of cases which have been studied the blowhole-forming gases are chiefly hydrogen and nitrogen escaping from solution: extremely probable that carbonic oxide coöperates, and probable that it too comes in large part from solution. Under other and yet unstudied conditions air mechanically drawn down in teeming may, however, prove to be an important cause of blowholes.

CHAPTER XII.

THE PREVENTION OF BLOWHOLES AND PIPES.

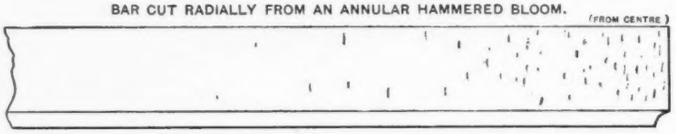
As a preliminary to the study of the prevention of blowholes and pipes in steel ingots let us next consider their proximate causes, and to that end let us examine their shape and position, and the conditions which exist while they are forming.

§ 222. SHAPE AND POSITION OF BLOWHOLES.—Blowholes are usually tubular or lenticular cavities, their axes normal to the cooling surface, their lower surfaces smooth,[a] their sides and especially their upper surfaces often covered with dendritic crystals. The surfaces of those nearest the outside of the ingot are iridescent or oxidized: those farther in, to which the atmospheric oxygen has not been able to penetrate, are silver white.[a b]

Fig. 17, BLOW-HOLES, (MÜLLER.)

Fig. 18, BLOW-HOLES, (GREENWOOD.)

Fig. 19, CENTRAL CAVITIES, (CHERNOFF.)
BAR CUT RADIALLY FROM AN ANNULAR HAMMERED BLOOM.



The blowholes usually lie in zones parallel with the outer surface of the ingot (Figure 18). Often a single zone exists near the outside: within this sometimes lie other similar zones (Figure 17), and within these we usually find the metal comparatively compact. As we approach the center cavities often reappear, and become more abundant the nearer we come to the axis, as Figure 19 shows. This represents a polished bar cut radially from a hammered bloom, the right-hand end having been at the centre of the ingot.[c] In the upper part of the ingot and surrounding the axis is the pipe, its sometimes almost friable sides often covered with fine crystals, (Figures 29 to 31, and 33).

Martens finds with the microscope three sets of markings and intrusions in the blowholes.

1st. Stripes, furrows, or foldings, perhaps caused by the compression due to the contraction of the neighboring metal.

(TO BE CONTINUED.)

NOTE.—The publishers of the ENGINEERING AND MINING JOURNAL will thank the readers of this article if they will promptly call attention to any inaccuracies they may observe in it.

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[a] Chernoff, Revue Universelle, 2nd Ser., VII., pp. 137-8, 1880.

[b] Müller, Iron, Jan. 9, 1883, p. 17.

[c] Chernoff, op. cit. The hammering has distorted the cavities, so that their axes are now parallel with that of the bloom

PERSONAL.

Mr. Charles M. Rolker, mining engineer, has returned from Central America.

Mr. Thos. H. Leggett, mining engineer, has returned from Honduras, Central America.

Mr. W. T. Wilkinson, of London, England, has passed through New York on his way to Chihuahua, Mexico, via. Denver Colo.

Mr. Thomas James, master mechanic, has been appointed assistant superintendent of the Edgar Thomson Steel Works, Braddock, Pa.

Dr. E. D. Peters, Jr., the well known metallurgist, is at present in Ontario. He will return to his home at Walpole, Mass., about the 30th inst.

Mr. Charles Butters, mining engineer and metallurgist, is about to build a milling plant at Kennett, Shasta County, Cal., to treat the low-grade sulphide ores of Northern California.

Mr. James C. Bayles, for many years editor of the *Metal-Worker*, of New York, has withdrawn from the editorship of that journal, and Mr. A. O. Kittredge has been appointed his successor.

Major N. S. Hill, who has been purchasing agent of the Baltimore & Ohio Railroad Company for some years, has tendered his resignation of that position, to take effect June 1st, and it has been accepted.

Mr. D. W. Bowman, formerly with the Phœnixville Bridge Company, Pa., is now consulting engineer in charge of bridges on the lines of the Central Railroad and Banking Company of Georgia. Mr. Bowman's headquarters are at Savannah, Ga.

Mr. C. D. R. Stowitz has succeeded the late Col. Ensign Bennett, as general manager at Buffalo of the Northwestern Coal and Iron Company, the Fairmount Coal Company and the Buffalo Coal Company. Mr. Stowitz was for ten years manager to Mr. F. H. Goodyear.

The American Association of Railway Chemists at a meeting held at Cleveland, O., on the 15th inst., elected the following officers: President, W. D. Gregory; vice-president, L. W. Brown; secretary and treasurer, G. M. Davidson. It was decided to hold the next meeting at Baltimore in October.

Scribner's Magazine for June, an advance copy of which has been sent to us, is an extremely attractive number to engineers particularly, for it contains a beautifully illustrated article (the first of a series) on railroads. This article, by the distinguished engineer Thos. C. Clarke, is on "The Building of a Railroad."

Mr. Jacobson, the chief executive officer for the Société des Travaux Publiques, one of the largest Panama Canal contractors, has been in this city recently on his way to France. He did not seem to think that the canal would be open for traffic in 1890, and said that if it was finished in four years, he thought it would be a great achievement.

Mr. Morgan G. Foote, Superintendent of Machinery at the Ontario and Daly mining companies, Park City, Utah, was accidentally killed last week. He was descending the cañon on horseback from the mine to the mill when he was overtaken by a runaway team and wagon, which ran into him. The road was so narrow that it was impossible for him to get out of the way, and both horses fell on him, breaking his spinal column, and death resulted in a few hours.

Prof. H. A. Newton, of Yale University, New Haven, Conn., has received from the National Academy of Science the Lawrence Smith gold medal, valued at $200, which, according to the donation, was to be awarded to any person who should make an original investigation of meteoric bodies, the results of which were made public, and were in the opinion of the Academy of sufficient benefit to science to merit such recognition. Prof. Newton is the first to receive the medal.

Professor Gerhard von Rath, of Bonn, died suddenly at Coblenz, Germany, April 23d, aged fifty-eight years. This distinguished savant had for many years held the professorship of mineralogy in the University of Bonn, and was at one time director of its mineralogical museum. Professor von Rath in 1883 undertook a long journey through the United States and Mexico. The results of his travels were the subject of numerous papers published in the transactions of various learned societies.

Prof. H. S. Thompson, of the U. S. Geological Survey, has gone to the Pacific slope. Eight field parties of the survey have left Washington. Three parties will go to the gold belt of California under the direction of Mr. H. N. Wilson, with Mr. R. N. Mokee and Mr. A. F. Dunnington as assistants; two to the Cascade Mountains, in Southwestern Oregon, under Mr. W. T. Griswold, with Eugene Ricksecker; and three to Montana under Mr. E. M. Douglass, with Messrs. Frank Tweedy and E. T. Perkins as aids. These parties are compelled to start at this early date in order to finish the work of triangulation before the summer haze sets in. They will have that done by the 1st of July, and from then to the middle of November will be devoted to topography, working out the details of the triangulation, and sketching relief charts of the country. The California parties will cover about 2000 miles each, and the Oregon and Montana parties from 3000 to 4000

FURNACE, MILL, AND FACTORY.

Active preparations are being made to start work on the new rolling-mill at Trinidad, Colo.

The Linden Steel Company, Pittsburg, Pa., turned out this week steel armor plates four inches thick and weighing over 10,000 pounds each.

The employés of the Pottsville Steel and Iron Company, Pottsville, Pa., have received notice of a 10 per cent reduction in wages, to take effect on May 21.

The Warren Foundries, at Hackettstown, N. J., owned by Messrs. Cooper & Hewitt, were to be put in blast this week. These works have been idle during the last five years.

The Delaware Rolling-Mill at Phillipsburg, N. J., has shut down, owing to a dearth of orders. The outlook for a speedy resumption of operations is not encouraging.

Messrs. Fraser & Chalmers, of Chicago, have been awarded the contract for the machinery for the new reduction works to be built at Butte, Mont., by the Hon. N. A. Clark. We referred to these works in our last issue.

The first casting made in the steel forging works of the Bethlehem Iron Company, Bethlehem, Pa., was made last week. The casting is the base for a large steel compressor, and over 120 tons of iron were used in making it.

The Syracuse Bolt Company and the Syracuse Screw Company, of Syracuse, New York, have gone into the hands of receivers. They were practically under the same management. The combined liabilities are about $77,000.

The Muncie Forge and Iron Company has been incorporated at Muncie, Ind., with a paid-up capital stock of $50,000. Messrs. John H. Carter, Lewis K. Torbett, Albert R. Corre and Charles T. Dickson, all of Cincinnati, are interested in the company.

The wages of the employés of Singer, Nimick & Co., Pittsburg, Pa., iron manufacturers, will also be reduced 10 per cent on May 28. An advance was granted February, 1887, and the proposed reduction will make wages the same as they were prior to that advance.

The Stony Creek Rolling-Mill Company, Norristown, Pa., suspended operations on the 12th inst. for an indefinite period. The reasons given are to the effect that the cost of sheared iron, freight, and expense of running are in excess of the receipts from the products of the mill. The firm has no orders for iron.

Mr. P. H. Miller, retiring assignee of Messrs. Graff Bennett & Co., of Pittsburg, Pa., has filed an inventory which shows that the assets of the company amount to $707,704.57. He has received $13,500 from the personal estate of John Graff, and $19,300 from the personal estate of Robert H. Marshall. He has paid out $40,447.21, and has $47,151.42 on hand.

The Straight Fiber Iron Company has nearly completed its new rolling mill at Chicago, Ill. A large part of the works will be devoted to making "straight fiber" axle bars, which will be furnished to railroad companies, car builder and others having their own forging plant for making axles. The daily capacity of the works will be 200 axles and about 50 tons of bar iron.

Pequest Furnace, owned by Messrs Cooper & Hewitt, situated near Oxford, N. J., will go out of blast during the latter part of May, owing to the continued depression in the iron business. The furnace is under the management of Mr. John S. Fackenthal, and has been in successful operation during the last two years, the product for one calendar year having reached 24,865 gross tons.

The twenty-six suits begun by Thomas Edison against the United States Electric Light Company three years ago, alleging infringement of patents, were decided on the 16th inst. by Judge Wallace, in the United States Circuit Court, in favor of the company. It is stated that this decision was only an intermediate point, and that the merits of the question are still to be decided.

The Pittsburg Steel-Casting Company, of Pittsburg, Pa., has shipped the gun recently cast, and to which we referred in previous issues, to Washington. Superintendent Hainsworth states that if the test of the gun proves successful the company will at once build trial guns on conditions similar to those under which the present gun was made for Russia, Italy, China, Austria and Japan.

The St. Louis Wire Mill Company, Dallas, Texas, on the 12th inst. filed a suit in the United States Circuit Court against the Washburn & Moen Manufacturing Company and other companies, claiming $300,000 damages for alleged malicious conspiracy to injure plaintiffs' business by circulating statements that the wire manufactured by the St. Louis Wire Mill Company had infringed some patents held by rival companies.

The steel-works and sheet rolling-mill of Henry Disston & Sons, at Tacony, Pa., were destroyed by fire on the morning of the 13th inst. It is estimated that the loss will be $300,000. The insurance on the works was $190,000. Machinery estimated to be worth $50,000 and a Worthington pump, which supplied Tacony with water, were destroyed in the flames. The cause of the fire is not known. The firm announces that notwithstanding this fire, they are in a position to handle all their orders with their usua promptness.

The Edison Phonograph Company has been incorporated at Newark, N. J., by T. A. Edison, A. O. Tate, C. Batchelor and J. C. Tomlinson, with a capital stock of $300,000. It is stated that the factory at Bloomfield, N. J., is turning out the phonographs at the rate of twenty a day, and unless something unexpected interferes, the first orders will be filled by the middle of June, or sooner. The price finally settled upon is $85. This will be for the ordinary "Commercial" phonograph, which Mr. Edison expects will take the place of the stenographer in business offices.

Messrs. Chess, Cook & Co., of Pittsburg, Pa., have gone into the manufacture of a patent fence, made from steel plates. The inventor of the new fence is John Golding, of Chicago, and the above firm have purchased the right for its manufacture in the States of Pennsylvania, New York, New Jersey, Ohio, Delaware, and West Virginia. They have contracted for the machines, and expect to be running them in the course of three or four weeks. The process of the manufacture of the fence is as follows: A small piece of soft steel plate is placed in the machine. The steel is cut diagonally in small strips, the operation being repeated until the entire plate is cut into small layers, which are double jointed at short intervals. As the work progresses these layers are gradually drawn apart until the steel plate is several times its original size, with the result that a piece of fencing eight feet long and any desired hight is produced.

CONTRACTING NOTES.

Machinery and supplies wanted. See page xiv.

Contracts open will be found on page xix. New contracts this week: No. 894, Iron Bridges; No. 895, Flexible Joint Pipe; No. 896, Pumping Engine; No. 897, Marine Engine; No. 898, Dredging; No. 899, Cut Granite; No. 900, Street Railway Equipment; No. 901, Street Lighting; No. 392, Supplies, Copper Plates, Acids, Crucibles, etc.; No. 393, Electric Light Plant; No. 394, Water Meters.

The contract for extending the iron car platform of the New York and Brooklyn bridge from Nassau street and Concord street, Brooklyn, was awarded to the Passaic Rolling-Mill Company, New Jersey, for $50,120.

The Aqueduct Commissioners, New York, have awarded the contract to which we referred in our last issue to O'Brien & Clark for completing Section 16 by laying 70,000 feet of 48-inch pipe and its appurtenances for $1,030,215.

Information has been received from Lisbon that tenders will be received by the Portuguese Ministry of Public Works, until noon, July 20th, for proposed harbor works at Funchal, Madeira. Further particulars may be obtained on personal application to the Commercial Department of the Foreign Office.

GENERAL MINING NEWS.

ARIZONA.

GILA COUNTY.

OLD DOMINION COPPER COMPANY.—During April one furnace ran thirty days and one ten days. Considerable development work has been done on the lower level. The Interloper shaft is now down to between the 3d and 4th levels. Coke continues to arrive at Globe almost daily, and the season is now so far advanced that no fear is entertained of high water in the Gila, at least until the summer rainy season sets in.

MARICOPA COUNTY.

According to reports, important platinum discoveries have been made in the Cave Creek District.

CENTRAL AMERICA.

HONDURAS.

A well informed correspondent sends us the following interesting and important items:

The New York & Honduras Rosario Mining Company, at San Juancito, the pioneer company of Honduras, is now in a most prosperous condition. The mine is opened by tunnels driven direct on the vein down to the 650-foot level, and is now producing 80 tons of ore per day.

The levels are 100 feet apart, and vary in length from 600 to 1400 feet on the vein, connected by winzes at convenient distances almost to the lowest level.

The ore consists of the decomposed sulphurets of copper, iron and some lead, carrying considerable chloride and native silver in a quartz gangue. It is lowered by means of skips down an inclined plane of 40 degrees pitch, a distance of 800 feet, to the Hallidie tramway, which is 6500 feet long and which delivers it into the mill.

The mill consists of 30 stamps, 12 pans and 6 settlers. Twelve Frue vanners have just been added, so arranged as to concentrate either before or after amalgamation, as experiment may prove advisable. A three-hearth roasting furnace is also in course of erection for chloridizing the concentrates, which will consist largely of undecomposed sulphurets.

Power is furnished the mill by a 6-foot Pelton wheel under 300 feet head.

The product at present is from 40 to 50 bars of bullion per month, weighing 100 to 110 pounds each and running from 600 to 800 fine in silver and 10 to 17 fine in gold.

The Santa Lucia Mining and Milling Company, at Santa Lucia, has a tunnel 635 feet long, cutting the ore zone at a depth of about 300 feet on its dip. The workings on the level of this tunnel for 400 feet along the vein have developed considerable ore, and are connected with the old workings above for ventilation.

As yet there has been no development done below the tunnel level.

The ore is galena, zinc blende, iron and copper pyrites, in a gangue of quartz and calcspar, with occasional streaks of gray copper, accompanied by proustite and rich silver sulphurets. Two iron frame stamp batteries are being erected, with discharge on all four sides of the mortars; also one White roasting furnace, four pans, two settlers, and two Duncan concentrators; two Hazelton boilers, one of 40 horse-power and one of 75 horse-power, supplying steam. Later, it is understood, a smelting furnace will be put up.

All the machinery is furnished by the Pacific Iron Works of San Francisco.

An output of bullion is confidently expected by September next.

The San Marcos Mining Company, at Salbana Grande, Honduras, has a mine opened up by two tunnels driven on the vein 250 feet apart, between which lie the old Spanish workings.

The vein is reported 4 feet wide in the lower tunnel and 6 feet wide in the upper, and the ore to be rich in native gold and silver, and sulphides of silver, assaying 80 ounzes per ton from the lower tunnel.

The mill is located close to the mouth of the latter and consists of 10 stamps, 4 pans and 2 settlers driven by a 75 h. p. engine.

It originally consisted of 10 stamps, copper plates and 2 Duncan concentrators, the intention being to ship the concentrates, but after furnishing several hundred tons of high grade tailings the concentrators were abandoned and pans put in, which are now working on the tailings together with ore from the mine.

The first product of bullion from the mill as reconstructed for the month of March was valued at $12,000, since which time the company has been shipping regularly.

At Curaren and Potosi, near the Pacific coast, 10-stamp gold mills are in course of erection on quartz veins formerly worked by the Spaniards, and in several other districts mining companies are taking hold here, beginning generally on a small scale, and endeavoring to pay their way as they go, having learned, it seems, from the Yuscaran fiasco of 18 months ago.

COLORADO.

CLEAR CREEK COUNTY.

LUCY GROUP MINING COMPANY.—This company has purchased for $35,000 the following properties known as the Lucy group of mines: the Lucy, Savannah, Charmer, Lady Elgin, Roanoke, Confidence, Ohio Belle, Seneca, Wyoming and Dew-Drop. These claims all adjoin one another, some running parallel and others crossing. The ground covered on the main vein is about one mile in extent. The veins were developed quite extensively by this company, it having expended about $10,000 in development work before taking up the bond which it held. Springfield, Mo., parties are interested in this enterprise.

TRIO GOLD AND SILVER MINING COMPANY.—The company's property, situated in Virginia Cañon, is being worked, and the company advise us that the results are in every way satisfactory and that bullion is shipped steadily. The stock is listed on the Mining Exchange but has not been dealt in for six years. It is held principally by the three trustees, Howard Saunders, U. M. Dean and Benj. Collins. Three fourths of the stock is owned by Mr. Saunders, who is secretary and treasurer; U. M. Dean is president. Until all the old debts of the company are paid and until there is a prospect of dividends, no stock will be offered on the exchange.

GILPIN COUNTY.

ROLLINS GOLD AND SILVER MINING COMPANY.—The placer claims of this company, on the South Boulder, below Rollinsville, have been leased. Operations have begun preparatory to an active season's work in ground sluicing. The little giants on the claim will not be worked this season, as it will require some length of time to get the placer in proper shape for their use in the future.

OURAY COUNTY.

BLACK GIRL.—This mine, situated in the Panquin district, four miles from Ouray, is about to be sold to St. Louis and Kansas City parties. The Black Girl was discovered three years ago and has since produced much ore and received developments which proves its worth.

SAN JUAN COUNTY.

VIRGINIUS AND TERRIBLE.—At these mines concentrating machinery is being put up to take the place of the old hand-jig system in handling the second class ore. Three years ago the Virginius was working about twenty-five men and the Terrible none. This spring the two mines have already a force of 300 men and their combined output for 1887 was 2450 tons of ore. With the cheap transportation now offered by the railroad the output will be more than doubled in 1888. These mines are 12,000 feet above sea level.

IDAHO.

ALTURAS COUNTY.

PHILADELPHIA & IDAHO COMPANY.—In reference to the report published by the Hailey *Times*, that the smelting-works of this company would shortly become the property of the Omaha & Grant Smelting Company, a gentleman officially connected with the former company, says: "There is not the slightest truth in the statement. The condition of affairs at the company's works is simply this: They are so situated that their profitable working depends largely upon the favorable terms for transportation that can be secured from the Union Pacific Railway Company. During the life of the late Vice-President Potter, these terms were very liberal and the mines were worked at a handsome profit. At the death of Mr. Potter, however, his arrangements were imperfectly understood and have not since been carried out. Owing to this, the Philadelphia & Idaho Company deemed it advisable to suspend smelting and mining low-grade ores, which it would not be profitable to ship until favorable terms from the railroad company could again be obtained.

As to selling the property, the thought has never been entertained by the present owners, who are all men of wealth and influence. The capital stock of the company is one million dollars, full paid, and of this eight tenths are held by one of the oldest banking firms in the country. The results from the mine working last year were in every way satisfactory, and a large mill was built from the profits."

PINE GROVE MINING COMPANY.—Two veins are being worked on the Gold Hill claim—one by cross-cuts and shafts, and one by a tunnel on the vein—both showing high-grade ore. The Mammoth claim is opened in two places, and a shaft was recently started on the Ramrod claim. Work on all the claims has been retarded somewhat by the difficulty of getting timber to the work on account of the snow. Mr. Johnson, the general manager of the company, is now in Denver making a contract for a stamp-mill, and expects to have it on the cars in 30 days.

PRIDE OF IDAHO.—The sale of this mine for $50,000 is reported.

CUSTER COUNTY.

The Big Copper group, near Houston, is about to be sold; but there is likely to be some trouble to get all the owners to agree to the sale.

KANSAS.

RENO COUNTY.

Four salt wells have been sunk in as many directions from Hutchinson during the last four months, and at a depth of 425 feet salt was again struck. The core drill has penetrated 25 feet in a solid deposit of rock salt equally as pure as the wells now producing the article for shipment. It is stated that thirteen companies have been formed and are at work.

HUTCHINSON SALT AND MINING COMPANY.—This company has been organized to mine salt and coal and manufacture soda ash and bi-carbonate of soda at Hutchinson, with a capital stock of $1,000,000. Dr. N. B. Wolf, of Cincinnati, is President, and H. M. Wisler, of Hutchinson, is Secretary.

MICHIGAN.

COPPER MINES.

ATLANTIC MINING COMPANY.—The company will thoroughly explore section 16 of its property the coming summer. This section is near the locality where a miner discovered a very rich vein in a shaft sunk by him a year ago.

CALUMET & HECLA MINING COMPANY.—Dispatches from Hancock, dated the 15th inst., state that all the shafts of the Calumet & Hecla mine are now open, and the sending down of gas has been stopped. President Agassiz, General Manager Whiting, and Superintendent Wright had a narrow escape from death on the 15th inst. By a mistake of the signal bells they were hoisted 1000 feet on the skip at the South Hecla, and were almost dumped headlong from a considerable height into a car in the shaft-house on the surface. Preparations are making at the smelting-works for the erection of an additional furnace.

IRON MINES.

SMITH-BUTLER.—Owing to the trouble experienced in sinking the working shaft at this new mine at Norway, of which J. G. Butler, of Youngstown, O., is one of the principal owners, it will not be able to ship any ore this season.

MONTANA.

DEER LODGE COUNTY.

GRANITE MOUNTAIN MINING COMPANY.—Official advices to us show that the shipments for April amounted to 159 bars, containing 271,664 ounces pure silver, and $3,563 gold. During the year to May 1st, 602 bars, containing 1,022,366 ounces pure silver, and $12,576.47 gold.

JEFFERSON COUNTY.

ELKHORN MINING COMPANY.—This company, which during the past year has met with a number of reverses in the drowning out of the A. M. Holter mine, is now again on the highway of success. The mine has been drained, the shaft sunk 150 feet deeper, levels have been run at three different points, and about 10,000 tons of ore developed. A large compound duplex double-acting Knowles pump is now being erected, making three in the mine, and ordinary capacity being 3,500,000 gallons a day, and this can be more than doubled by crowding them. The plant is also being increased. Five stamps are being added to the mill and a new 60-inch White & Howell roaster.

SILVER BOW COUNTY.

BLUE BIRD MINING COMPANY.—The company is about to erect a large stamp-mill to enable it to increase its output.

LEXINGTON MINING COMPANY.—Official advices to us show that the production for April amounted to $12,153.96 in gold, $80,439.24 in silver, making a total of $92,593.20.

NEVADA.

ELKO COUNTY.

A contract has been closed for the erection of a concentrating plant of a daily capacity of 100 tons at Tuscarora. The contract calls for the completion of the works within sixty days from date. The water supply is abundant through the system adopted by the management of draining all the mines on the lode into the Navajo shaft, from whence it is pumped for service at the mills and concentrators. The successful working results of this plant will lead, it is said, to the erection of a similar one by the Grand Prize Mining Company.

PIEDMONT GOLD AND SILVER MINING COMPANY.—This company has been incorporated in San Francisco to operate in Tuscarora district. The capital stock is $10,000,000. The shares, $100 each. The directors are: A. E. Davis, Herman Zedig, J. B. Dayton, L. Fannof and W. R. Townsend.

LANDER COUNTY.

MANHATTAN SILVER MINING COMPANY.—At a recent stockholders' meeting it was decided to distribute the treasury stock at the rate of share for share for every share now outstanding.

STOREY COUNTY—COMSTOCK LODE.

We take the following from the Virginia City *Chronicle:*

The pay-rolls of the Comstock mines for April, according to official figures, amounted to $347,166.

Statement of the ore and bullion product of the Comstock lode mines for the quarter ended March 31st, 1888, obtained from the official reports of superintendents now on file in the assessor's office:

CHOLLAR MINING COMPANY.—Produced 1415 tons of ore, yielding a total of $21,795.70 in bullion; average yield per ton, $15.40, actual cost of extraction, $13,799.25; cost of reduction and sale, $9905; cost of production above yield, $2908.55; no tax.

CONFIDENCE MINING COMPANY.—Produced 1722 tons of ore, yielding bullion valued at $42,541.72; average yield per ton, $24.70½; actual cost of extraction, $22,238.87; cost of reduction and sale, 10,332; transportation, $2,629.05; net yield above cost of production and subject to bullion tax, $7341.60; bullion tax, $256.95.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—Produced 39,552 tons of ore, yielding a total of $921,903.77 in bullion; average yield per ton, $23.30, actual cost of extraction, $305,278.62; actual cost of reduction, including transportation, $276,864; net yield above cost of production and subject to bullion tax, $339.761.15; total bullion tax on net proceeds, $10,192.90. The production for April amounted to $418,729.43.

HALE & NORCROSS MINING COMPANY.—Produced 7958 tons and 900 pounds of ore, yielding bullion valued at $236,047.32; average yield per ton, $29.66; cost of extraction and transportation $79,867.33; cost of reduction and sale, $102,756.69; net yield above cost of production and subject to bullion tax, $54,423.30; bullion tax, $1632 69.

KENTUCK MINING COMPANY.—Produced 1027 tons of ore, yielding bullion valued at $13,055.50; average yield per ton, $12.71; cost of extraction, $9756.50; transportation and reduction, $6418.75; cost of production above yield, $3119.75; no tax.

POTOSI MINING COMPANY.—Produced 3050 tons of ore, yielding bullion valued at $56,461.16; average yield per ton, $18.51; cost of extraction, $35,973.88; cost of reduction, $21,350; cost of production above yield, $862.72; no tax.

YELLOW JACKET MINING COMPANY.—Produced 16,780 tons of ore, yielding bullion valued at $121,027.82; average yield per ton, $7.80; cost of extraction, $88,598.80; cost of reduction and transportation, $119,317.55; cost of production above yield, $86,888.53; no tax.

The product of the Savage is not included in the above list, which will swell the total to above $1,500,000. The product of the first quarter of the current year exceeds that of the yield of the last quarter in 1887 nearly $400,000.

BROPHY MINING COMPANY.—Work has been resumed in the Brophy mine in Flowery District, and ore is being extracted from the main tunnel in a winze sunk below the tunnel level. The North Bonanza has an incline shaft sunk to the depth of 900 feet, less than 400 feet from the Brophy line. As this incline is in good repair the Brophy vein could be cut at that depth with slight cost by sending in a northwest drift from the bottom of the incline.

BELCHER MINING COMPANY.—Hoisting works are now being built preparatory to resuming operations in the mine through the Crown Point shaft, and the mine drained down to the 2700 level, where ore of fine quality was cut before the lower levels were flooded. It is stated that subsequent explorations on the 1700 level have convinced the management that an important body exists there, hence the conclusion to drain the mine to that depth.

CHOLLAR MINING COMPANY.—The change in the new mill near the Chollar shaft from the Logan process of amalgamating ore pulp to the tank system will soon be accomplished. This will admit of the handling of 170 tons of ore daily by the mill, which is 40 tons above its capacity under the present process. Preparations for operating the mill by electricity are in progress. A station for the reception of a Pelton wheel and five dynamos is being excavated on the 1750 (Sutro Tunnel) level of the Chollar main incline. The management anticipate that the plant will be in operation by July 1st.

CONFIDENCE MINING COMPANY.—The clean-up and final shipment on April account brings the total bullion product for that month up to $201,646.

HALL & NORCROSS MINING COMPANY.—The numerous experts who have inspected the recent ore developments, now producing 200 tons of $35 ore per day, are unanimous in the opinion that there is a large amount of ore in sight in the area of ore stripped on the 700 and 400 levels. The *Chronicle* is officially assured that regular monthly dividends will be declared by the company so long as the present ore crushing capacity is available. The Secretary's financial statement rendered at the directors' meeting held in San Francisco on the 1st inst, showed a surplus of $104,097.77, including $88,097.72 gold coin in bank and about $16,000 in silver bars at the Carson Mint. There will be other shipments of silver bars before the fiscal month closes. The above is almost a clean surplus above all expenses. The bullion is first shipped to the Carson Mint, where it is parted, and the gold is retained to pay the expenses of mining and milling, and the silver is sent to San Francisco to be sold. The gold contained in the bullion is almost sufficient to pay operating expenses. Mr. Joel F. Lightner, the present secretary, is now serving his twenty-eighth consecutive year in that capacity, and he has served through several changes of administrations.

SUTRO TUNNEL COMPANY.—At the annual meeting of the Sutro Tunnel Company, recently held in San Francisco, the following officers were elected: Theodore Sutro, President; P. N. Lilienthal, Vice-President; Pelham W. Ames, Secretary; C. C. Thomas, Superintendent; Anglo-California Bank, Treasurer; H. H. Thayer, Assistant Secretary and New York Transfer Agent; Theodore Sutro, Attorney and Counselor; California Safe Deposit and Trust Company, San Francisco and California Registry; Union Trust Company of New York, the New York Registry. An abstract of the annual report was published in our last issue. John Landers, Moritz Meyer, and Frederick Roeding brought suit in the Superior Court at San Francisco on the 9th inst. against the Sutro Tunnel Company. Plaintiffs allege that no election of directors of said corporation was held since last year until the fourth day of May, 1888; that a pretended meeting of the stockholders of said corporation was held on the fourth day of May, 1888. The legality of this election is questioned, and the court is asked to order and adjudge that the election held on the fourth day of May, 1888, be set aside and declared null and void; also that a new election of directors for said corporation be ordered.

The case of Hugh McCalmont against the company was, by agreement of counsel, submitted for decision to Judge Sabin, in San Francisco, May 8th. The suit was not tried in the usual way, but a voluminous mass of testimony taken by a commissioner, as well as a vast quantity embodied in depositions, has been presented to the Judge for examination.

WOODVILLE CONSOLIDATED GOLD AND SILVER MINING COMPANY.—This company has purchased the South Capital ground for $75,000. It is adjoining the ground owned by this corporation. At a meeting of the board of directors J. J. Scoville was elected Secretary, and it was voted by the directors to list the stock on the San Francisco Board. It was also decided in the near future to erect a ten-stamp mill. The company is also negotiating for the purchase of other grounds. Active work will begin at once.

NEW YORK.

CHAUTAUQUA COUNTY.

The test well near Findlay's Lake has stopped the drill at a depth of 1,600 feet. It is probable that the stockholders will order the drill to go deeper.

OHIO.

Mr. William Fleming, an agent of the Standard Oil Company, of Oil City, has transferred to the National Transit Company, for $121,000, 48 acres of land recently purchased at South Chicago, Ill. The land is situated on the lake shore and is intersected by the Baltimore & Ohio Railroad. It is expected that the Standard Oil Company will build refineries on this ground to prepare oil for fuel purposes. It will be brought in a pipe line from Lima, Ohio.

WOOD COUNTY.

PALMER OIL COMPANY.—According to press reports a well owned by this company has been drilled into the Trenton rock, and is flowing 500 barrels a day of a queer substance that is neither oil nor water. It has been named "riley oil" because of the peculiar color, it being to general appearance of what in a boarding-house is termed "muddy coffee." It will burn slowly, but there is not enough of the inflammable quality about it to warrant the Buckeye Pipe Line in accepting it as fuel oil, and the consequence is there is no use for the stuff. A great hole has been dug in the ground and the unclassified product is being conducted into it and burned.

PENNSYLVANIA.

DELAWARE & HUDSON CANAL COMPANY.—At the annual meeting, recently held, it was shown that business for the year, according to the annual report, resulted in a profit of $2,910,305. The leased lines were operated at a loss of $37,622. The company mined 4,063,586 tons of coal and received from sales of coal $10,100,118, resulting in a profit of $1,800,793, while its railroad business resulted in a profit of $1,109,512. The directors submitted a proposition to appropriate from the surplus, from time to time, 25 per cent of the bonded debt due in 1891, and to credit these appropriations as cash payments on the stock to be issued to stockholders of record when subscriptions are opened. The stockholders approved this proposition by a unanimous vote. The old board of directors was re-elected.

COAL.

A. Pardee & Co., and Linderman & Skeer, largest coal operating firms in the Lehigh region, have given notice to all their employés that after the 12th inst. they would no longer pay wages every two weeks, in accordance with the act of the Legislature of May 23, 1887, providing for the semi-monthly payment of wages in that State, but would return to the old system of paying only once a month.

At a meeting of the commission appointed by Governor Beaver to locate and establish hospitals for injured miners in the bituminous and semi-bituminous coal regions held at Harrisburg, on the 15th inst., it was decided to locate these hospitals in the 3d, 5th, and 8th districts. Another meeting of the commission will be held at Altoona on the 6th of June.

CONNELLSVILLE COKE AND IRON COMPANY.—The engines and hoisting machinery of the new coke plant of this company, at Leisenring No. 3, are on the ground and partly in place, and the boiler and engine houses are about completed. Work on the 500 new ovens will now be pushed rapidly ahead.

OIL

The chief of the Bureau of Statistics reports the total values of the exports of mineral oils from the United States for the month of April, 1888, and during ten months ended April 30th, 1888, as compared with similar exports during the corresponding periods of the preceding year, as follows: April, 1888, $3,132,872; April, 1887, $3,201,103; ten months ended April 30th, 1888, $37,821,308; April 30th, 1887, $37,212,107. The exports from the above-named ports comprise about 99 per cent of the total exports of mineral oils. It is stated on good authority that the distillation of 100 gallons of crude petroleum will yield 76 gallons of illuminating oil, 12 gallons of gasoline, benzine or naphtha, 3 gallons of lubricating oil, and 9 gallons of residuum.

UTAH.

MILLARD COUNTY.

One car of bullion, going 10 per cent in gold and 90 per cent in copper, has been shipped to Salt Lake from the new smelter at Ingersoll, in the Detroit mining district, and is probably the continuation of a steady stream.

SUMMIT COUNTY.

ONTARIO SILVER MINING COMPANY.—The production for April amounted to 85,377.21 ounces of fine silver; by ore sales, $73,476.55; an approximate total of $158,853.76.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 18.

Statistics.

Production Anthracite Coal for week ended May 12th, and year from January 1st:

TONS OF 2240 LBS.	1888. Week.	1888. Year.	1887. Year.
P. & Read. RR. Co.	141,042	1,763,853	2,725,356
Cent. R. R. of N. J.	121,300	1,727,622	1,700,591
L. V. RR. Co.	189,508	1,960,769	2,585,040
D., L. & W. RR. Co.	191,437	2,355,272	1,873,365
D. & H. Canal Co.	57,464	1,573,804	1,407,320
Penna. RR.	67,590	1,482,698	1,113,535
Penna. Coal Co.	32,132	525 092	499,833
Total	710,473	11,389,110	11,905,040
Decrease	5,894	515,930	

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:

1883..... 10,412,742 | 1885..... 8,794,798
1884..... 10,009,642 | 1886..... 10,607,744

Production Bituminous Coal for week ended May 12th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated

EASTERN AND NORTHERN SHIPMENTS.

	1888. Week.	1888. Year.	1887. Year.
Phila. & Erie RR.		23,079	363
Cumberland, Md.	68,627	1,226,627	969,106
Barclay, Pa.	2,773	68,526	84,039
Broad Top Pa.			
H. & Broad Top. RR.	4,693	144,019	144,450
Clearfield Region, Pa.			
Snow Shoe	810	51,851	66,565
Karthaus (Keating).	833	61,977	71,182
Tyrone & Clearfield.	69,140	1,308,291	1,164,917
Tipton	1,807	21,591	901
Alleghany Region, Pa.			
Gallitzin & Mountain.	16,120	346,121	316,129
Pocahontas Flat Top Coal,			
Norf'k & West. RR.	33,848	587.417	432,059
Kanawha Region, W. Va.			
Ches. & Ohio RR.	†27,831	685,295	566,213
Total	217.482	4,524,794	3,815,904

* Tons of 2240 lbs. † May 7th.

WESTERN SHIPMENTS.

Pittsburg Region, Pa.			
West Penn RR.	9,215	148.559	120,477
Southwest Penn. RR.	1,850	38 524	58,729
Pennsylvania RR.	5,112	105,115	83,983
Westmoreland Region, Pa.			
Pennsylvania RR.	36.232	647,221	562,225
Monongahela Region, Pa.			
Pennsylvania RR.	10,669	123,709	130,165
Total	63,078	1,063,128	955,579
Grand total	280.560	5,587,922	4,771,483

Production of Coke on line of Pennsylvania RR, for week ending May 12th, and year from January 1st, in tons of 2000 pounds: Week, 76,911 tons; year, 1,421,614 tons; to corresponding date in 1887, 1,512,150 tons

Anthracite.

Mr. John H. Jones, Chief of Bureau of Anthracite Coal Statistics, has issued the following statement of anthracite coal tonnage for the month of April, 1888, compared with same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employés and for steam and heating purposes about the mines, but does not represent the entire anthracite coal tonnage actually transported by the respective railroad companies, adjustment being necessary in the compilation to avoid duplications, etc.

COMPANIES.	April, 1888.	April, 1887.	Difference.
Phila. & Reading RR.	636,309	604,475	Inc. 31,834
Central RR. of N. J.	455,248	484,940	Dec. 29,692
Lehigh Valley RR.	496,533	607,320	Dec. 110,786
Del., Lack. & West. RR.	438,210	372,007	Inc. 66,203
Del. & Hud. Canal Co.	296,264	240,407	Inc. 55,856
Pennsylvania RR.	351,352	294,214	Inc. 57,138
Pennsylvania Coal Co.	103,055	115,434	Dec. 12,378
N. Y., L. E. & W. RR.	79,622	68,000	Inc. 11,622
Total	2,856,593	2,786,797	Inc. 69,796

COMPANIES.	For year 1888.	For year 1887.	Difference.
Phila & Reading RR.	1,496,045	2,210,778	Dec. 714,733
Central RR. of N. J.	1,507,231	1,528,921	Dec. 21,690
Lehigh Valley RR.	1,577,392	2,116,335	Dec. 538,943
Del., Lack. & West. RR.	2,195,048	1,656,907	Inc. 538,140
Del. & Hud. Canal Co.	1,478 541	1,232,317	Inc. 246,224
Pennsylvania RR.	1,320,581	1,057,457	Inc. 263,124
Pennsylvania Coal Co.	464,384	430,463	Inc. 33,922
N. Y., L. E. & W. RR.	287,114	259,206	Inc. 27,908
Total	10,326,336	10,492,384	Dec. 166,048

	April, 1888.	April, 1887.	Difference.
From Wyoming Region	1,502,187	1,341,361	Inc. 160,826
From Lehigh Region.	465,564	571,675	Dec. 106,111
From Schuylkill Region	888,842	873,761	Inc. 15,081

	For year 1888.	For year 1887.	Difference.
From Wyoming Region	7,694,290	5,457,574	I. 1,636,716
From Lehigh Region.	782,163	1,877,331	D. 1,095,168
From Schuylkill Region	2,449,883	3.157,480	Dec. 707 597

The stock of coal on hand at tide-water shipping points April 30th, 1888, was 733,314 tons: on March 31st, 1888, 465,709 tons; increase, 267.605 tons.

There is a better tone to the anthracite market than we have had to record for some time past; but the quantity of business done is perhaps no greater, if as much, as it was last week. Individual operators, who have been cutting prices very heavily, are stronger in their figures, and have even advanced them somewhat during the past week. They have taken orders enough to keep them running for some time to come, and are more independent. Some of these sellers have even touched circular prices on stove coal, but are still shading on manufacturing sizes.

The Lehigh operators are, as usual, the chief cutters, and there was quite a little breeze in the meeting of the sales agents this week over the low prices quoted for pea coal and some other sizes to Eastern buyers. It is said that prices as low as $2.42 net were asked in the case of one contract, but the order for some reason was given to another producer at a considerably higher rate, in fact, not very far from the net price of the companies' circulars. The amount of the order was 20,000 tons.

We hear of a contract for the Brooklyn Water-Works for Plymouth Broken coal, delivered free on cars at Hunters Point, at $4.52 a ton, which is considered equal to circular rates.

We hear of a shipment of 500 tons pea coal to Rio Janeiro, but have not learned particulars of the transaction. We also learn of a sale of 10,000 tons of Lehigh pea coal to the East, at prices very nearly up to companies' circular.

We publish herewith the statistical report of Mr. John H. Jones, for the anthracite output during April, and for the year to the first of May. An analysis of this table shows that during the four months of this year to May 1st, the Philadelphia & Reading and the Lehigh Valley have been largely behind their output of the corresponding period last year. This, of course, was due to the strikes, which stopped all production during the early part of the year in each of these regions. On the other hand, the Lackawanna & Western has increased its output 538,000 tons this year, or nearly 33 per cent increase over its production in 1887. The Delaware & Hudson has increased 246,000 tons over the first four months of 1887, or say 20 per cent. The Pennsylvania Railroad has increased 25 per cent over its production in 1887. We have here, then, the causes for the depression in the market during the present season, and for the distrust shown by consumers in the ability of the companies to keep prices up to the standard at which they were started. It is now said that prices will be maintained at their range up to July at least—it would be folly to think of increasing them before that date; but if the companies continue to turn out coal at the rate they have been doing, disregarding the understanding that the production is to be limited to last year's output, there is no telling what may happen a little later on in the season.

Stocks have grown during the month past 267,000 tons, and are up to 733,000 tons at tidewater, with a good deal at other points. The current month promises to exceed the quota quite as much as last month, and it is certain that the stocks on hand at this rate would soon become dangerously large. There is now an excellent opportunity for the companies mentioned to show their forbearance in the interest of the trade, for nothing strengthens a market so much as short supplies, and nothing weakens it so rapidly as increasing heavy stocks.

Circular quotations continue as follows: Broken, $3.75; Egg, $4; Stove and Chestnut, $4.25; Pea, $3 to $3.30 for free burning coals, f.o.b.

The shading of individual operators is now much less than it was, and in amount is a matter of promptness in acceptance rather than extent of order.

Bituminous.

In soft coal we hear less of cutting prices, especially less talk of the Cumberland companies doing so. The Pocahontas still continues to shade, and, in fact, has been the chief demoralizer in the market. This, however, may possibly be accounted for by the rumors which are circulated, and apparently with some foundation, that cargoes of this coal have recently caught fire spontaneously. We hear of such a case in Havana, and of another in the sheds of the Boston-Maine road.

It would require but few such examples to considerably lessen the market value of this otherwise desirable coal. And it is possible these rumors have obtained such credence that the company has found it desirable, or perhaps necessary, to make concessions in price on that account.

The business is still rather dull in soft coal, and the large buyers are still keeping out of the market, apparently with the expectation of getting better rates. We believe they will wait in vain; but the cuts by both the Cumberland and Virginia companies have certainly given them some reason for this expectation.

We continue to quote $2.50 to $2.60 f.o.b. at the tidewater ports.

Boston. May 17.

[From our Special Correspondent.]

The improvement predicted for the Eastern market in this correspondence has made its appearance. There is a very fair amount of business being done. So far as I can learn the orders are being booked for delivery throughout the season as well as at this time. It evidences some degree of confidence in the market. The quotations of the companies are well maintained. Broken coal seems to be in lighter supply than any other size. Egg, stove and the smaller sizes are to be had in plenty, and there is more or less cutting of rates on these sizes, say from ten to fifteen cents. On broken prices are well maintained It is claimed that all the cutting is done by individual shippers.

Is the pool in bituminous coal about to break or not? That is the question most frequently considered by the trade in soft coal. It is claimed by some who ought to be well informed that there is much more talk in the trade about cut prices than there is any occasion for. It is admitted that sales have been made to retailers upon the same basis as to middle men, viz., $2.54 f.o.b., and while this is in violation of the agreement, no particular point is made as to it. But it is claimed that there is much exaggeration as to the cutting on railroad and manufacturing contracts. How true this is will appear later on. Doubtless efforts are being made to smash the pool, but so much coal has been bought, and losses would be so large under the protective clause if a decline should come, that it is quite generally thought no break will occur. A year ago a break was held in check in the same way, and shippers hope it will work again. The reason that the Boston & Albany has not bought is said to be that they have have been giving competing coals quite extensive tests, but are now about to place their contracts.

Freights are well maintained.

We quote, exclusive of discharging: New York, 80@85c.; Philadelphia, $1@$1.10; Baltimore, $1.10@$1.15; Newport News and Norfolk, $1.05@$1.10; Richmond, $1.15@$1.25.

There is not much doing at retail. We quote prices as follows, 2000 pounds to the ton, delivered: Stove, $6; Egg, $5.75; Broken, $5.50; Nut, $6; Franklin, $7.25; Lehigh, Egg, $6; Broken, $5.75; Bituminous (on the wharf), $2.25.

Buffalo. May 17.

[From our Special Correspondent.]

Quotations for coal unchanged. Trade without any great animation. Consumers taking only for immediate requirements (both of hard and soft varieties). Manufacturing concerns are not producing to full extent of capacity, hence limited demand for fuel. A dealer says that "the anthracite coal trade is in a very unsatisfactory condition, and the bituminous interest is many shades worse." No special contracts have been made as far as can be ascertained, and the usual amount of reticence is observable among dealers. Stocks of all kinds ample, especially bituminous.

Sealed proposals are asked for until May 24th by our Water-Works Commissioners for 12,000 to 15,000 tons of grate anthracite coal, to be received by canal, and delivered at the lower pumping station, the city to furnish the power for hoisting; the successful bidder to pay for handling and trimming.

The past week has witnessed great activity on the docks in consequence of the excellent demand for vessels and free shipments of coal. Every kind of craft, many before arrival, were readily taken, and an advance of 10c. was obtained for Chicago, Milwaukee, and 5c. for Racine cargoes, closing strong with a continued good inquiry.

The shipment of coal by lake from May 10th to 16th, both days inclusive, 92,420 net tons, viz.: 30,180 tons to Chicago, 19,390 to Milwaukee, 20,690 to Duluth, 1880 to Racine, 2500 to Sandusky, 5380 to Toledo, 450 to Saginaw, 4200 to Washburn, 650 to Kenosha, 7050 to Superior, and 700 to Detroit. Total shipments thus far this season, 200,229 net tons. The rates of freight were 75@85c. to Chicago and Milwaukee, 60c. to Superior, Washburn and Duluth, 85@90c. to Racine, 85c. to Bay City, 50c. to Saginaw and Port Huron, 90c. to Kenosha, 35c. to Detroit, 40c. to Toledo, and 50c. to Sandusky.

Navigation fully opened on Lake Superior. Vessels arriving and departing from all ports, and at Duluth on the 12th inst.

By-the-by, Mr. J. B. Conard, the agent, and Mr. A. B. Eldridge, the manager, of Messrs. Coxe Brothers, have opened an office in the Coal and Iron Exchange.

Brief mention was made in my last letter relative to the disastrous explosion of natural gas in our city. There is no doubt that by some accident the valves of the distributing meters failed to act, and as a result the immense pressure caused the small house and building meters to burst, and as a sequence the gas rushed in, and, in cases where there were lights, combustion ensued. The company's experts have been and are now engaged in ascertaining the causes of said explosions and providing remedies for prevention of future casualties, in conjunction with a committee of the Common Council and others. From indications it seems that the company will have to pay for all damages, including of course the cost of rebuilding our cathedral. The bills may foot up $100,000 Want of space precludes further reference to this subject other than that the city was miraculously so to say, saved from almost total destruction, and an enormous loss of life would have resulted. Columns would be necessary to give details to make the situation clear to your readers.

Mr. H. C. Underhill has been appointed manager of the anthracite coal department of Mr. Z. H. Goodyear's extensive business.

Messrs. J. H. & W. H. Ball have formed a partnership as wholesale and retail dealers and shippers of anthracite and bituminous coal. Both have been in business before, the first with Mr. Thomas Loomis, and the latter with Mr. Henry E. Smith, and have had much experience.

Messrs. Williams & Peters, another new firm in the coal trade, have opened an office here for the sale of the New York, Lake Erie & Western Railroad Company's anthracite and bituminous product. The office is in charge of Mr. Minot E. Robinson.

Mr. Wm. T. Roberts, late with Andrew Langdon & Co., has started in business for himself here.

At Ashland, L. S., vessels are delayed in unloading, in consequence of a strike among the laborers for higher wages. The men demand 14c. per ton for coal or 50c. per hour.

Our International Fair and Exposition will be held September 4th to 14th. New buildings to cost $500,000 are being constructed. Should any of your readers wish for space, early application must be made. Coal exhibits might and should be an important feature of the enterprise.

Pittsburg. May 17.

(From our Special Correspondent.)

Coal.—There have been no coal shipments since our last, and a large number of loaded crafts in the pool will take their departure the first rise. A number of boats have kept light to bring up empty boats and barges from the lower ports. Notwithstanding the large shipments since the first of January, the stocks in the Southern and Western markets are light.

The Detroit Gas Company has awarded the contract for 15,000 tons of coal to the Youghiogheny & Ascatabula Coal Company, of Pittsburg. There is said to be considerable cutting on what is supposed to be the association selling price of coal. Some of the members are said to be taking contracts at figures below $1.10.

PRICE OF COAL PER 100 BUSHELS = 7600 LBS.

First pool	$4.75	Fourth pool	$3.25
Second pool	4.25	Railroad coal	5.00
Third pool	3.75		

Connellsville Coke.—The situation remains unchanged. There is no new feature of importance. With a good trade demand, at unchanged prices, we quote nominally: Blast-Furnace, $1 f.o.b. cars at works; foundries, $1.15.

Freights.—New rates to Pittsburg, 80 cents per ton; Chicago, $3; Springfield and Urbana, Ohio, $2.75; Toledo, $2.90; Cincinnati, $2; Indianapolis, $2; all valley points, $1.50; East St. Louis, $3.50; St. Louis, $3.65. Other points same proportion.

FREIGHTS.

The latest actual charters to May 17th, per ton of 2240 pounds:

From Baltimore to:—Bangor, Me., 1.10@1.15; Bath, 1.15@1.20; Boston, 1.10; Bridgeport, Conn., 1.00; Brooklyn, .90@.95; Charleston, .80; Fall River, .95; Galveston, 2.90@3.00; Gardner, Me., 1.40@1.50; New Bedford, .95; Newburyport, 1.30; New Haven, .95; New London, 1.00; New York, .90; Pawtucket, 1.10; Portland, 1.10; Portsmouth, N. H., 1.10; Providence, .95; Richmond, Va., .70; Salem, Mass., 1.10; Savannah, .80@.90; Williamsburgh, N. Y., .90; Wilmington, N. C., 1.00@1.10.

From Philadelphia to:—Alexandria, .85; Bath, Me., 1.05*; Boston, 1.05*; Charleston, .70@.75; Charlestown, .90*; Chelsea, .90@1.00*; Com. Pt., Mass., .95@1.00*; East Cambridge, .95*; Fall River, .90*; Gloucester, 1.10*; Lynn, 1.10@1.25*; Marblehead, 1.05*; Milton, 1.15*; New York, .90†; New Bedford, .90*; Newburyport, 1.20@1.25*; Norfolk, .55; Portland, 1.10@1.15*; Portsmouth, Va., 1.15*; Providence, .90*; Richmond, Va., .70; Salem, Mass., 1.05*; Saugus, 1.12*; Savannah, .80@.90; Washington, .85; Wilmington, N. C., .80@.95.

From New York to:—Bath, Me., .75*; Beverly, .75; Boston, .70*; Bridgeport, Conn., .50; Cambridge, Mass., .70*3c; Cambridgeport, .70*3c.; Charlestown, .70*; Chelsea, .70*; Com. Pt., Mass., .70*; E. Boston, .70*; E. Cambridge, .70*3c., E. Greenwich, R. I., .75; Fall River, 75; New Bedford, .80; Newburyport, 90*; New Haven, .50; New London, .70; Newport, .75; Norwalk, Conn., 55; Portsmouth, N. H., .85*; Providence, .75; Salem, .70@75*.

* And discharging. 3c. per bridge extra. † Alongside.

MARKETS.

NEW YORK, Friday Evening, May 18.

Prices of Silver per ounce troy.

May	Sterling exchange	Lond'n Pence.	N. Y. Cents	May	Sterling exchange	Lond'n Pence.	N. Y. Cts.
12	4.88	*	92	16	4.88¼	42	91⅞
14	4.88	*	91⅞	17	4.88½	41¾	91⅝
15	4.88	*	91⅞	18	4.88½	41¾	91¼

* 42 1-16.

Market has been weak, owing to small demand for Eastern exchange.

Forty-one and three quarters pence for silver is, we believe, the lowest price yet recorded for this metal.

It is hoped to be but temporary, and that with increased demands from India the price may improve somewhat, though there is no prospect of high prices in the near future.

Foreign Bank Statements.—The governors of the Bank of England at their weekly meeting made no change in its rate for discount, and it remains at 3 per cent. During the week the bank gained £101,000, and the proportion of its reserve to its liabilities was raised from 36·08 to 38 per cent, against an advance from 46·86 to 47·16 per cent in the same week of last year, when its rate for discount was 2 per cent. The weekly statement of the Bank of France shows gains of 3,075,000 francs gold and 1,325,000 francs silver.

Copper.—Since we last reported the market has undergone very little change. The negotiations on the part of the syndicate (through its representatives) alluded to in our last issue with reference to a sale to consumers, are said to have resulted in such a sale being made for the months of May, June and July at 16½c., and should this prove to be actually the case, we may expect the price of Lake copper to keep at, or even slightly above, this figure for the period mentioned and probably somewhat longer, as the lake companies on whose behalf the sales are nominally made, viz., the Calumet & Hecla, Tamarack, Quincy, Atlantic, Franklin, Osceola, Central, Huron, Allouez and Copper Falls, undertake, according to the terms of the contracts, not to sell to any one else below that price. Of course, it is quite understood that these sales are really being made on behalf of the syndicate. As to the quantity embraced in the contracts, we have not as yet been able to obtain any reliable information, every consumer being in this instance invited to contract individually, and the negotiations not being carried on between the sellers and the general body of consumers, as has been customary in previous pool sales. The form of contract also prohibits the buyer from reselling more than a comparatively small portion of his purchase, and even then he must only sell this quantity to consumers at a price not less than ½c. above the price at which he contracts to purchase. A heavy penalty is attached to any violation of the provisions of the contract. The foregoing embrace the main provisions of the form of contract submitted by the sellers to the different manufacturers.

The market opened firm at the beginning of the week with large purchases (presumably for account of the syndicate), and about half a million pounds were sold for May, June and July at 16·70. Since then, however, the market has eased off slightly, as the buyers have apparently withdrawn for the present. Our closing prices are: Spot, 16·65; May, 16·65; June, 16·65; July, 16·65; August, 16·55; September, 16·50. The total of the transactions for the week amounted to about three quarters of a million pounds.

In London the market for Chili Bars has fluctuated between £81 15s. and £83 for spot, and £75 and £78 for three months prompt, the last cabled prices being: Spot, £82 10s.; three months prompt, £75 5s. With reference to shipments from Chili there is an apparent slight increase, but we are advised that this is owing to shipments of old stocks, production remaining stationary, and the advance in wages and prices of coal will no doubt prevent any further increase for the present. Our friends also refer to the threatening condition of the coal market owing to a considerable deficiency in the output of the mines which interferes with all manufactures, and smelters are in consequence compelled to restrict their operations very much. At the time of writing transactions had come almost to a complete standstill.

We have received the following telegram from Calumet this morning: "The fire in the mine practically out. Captain Wills has been to the spot where fire started. Says no signs of fire, nor felt any inconvenience from gas. All the five shafts on the Calumet, as well as No. 3 Hecla shaft, open. Men working in the latter, as well as Calumet No. 5. Repairing and unwatering will now go on."

Messrs. James Lewis & Sons, under date May 1st, report as follows:

Judging from the scarcity of cash warrants, nearly the whole of the stock of Chili bars in England and France, 42,050 tons, must now be held by the syndicate, in addition to several thousand tons yet to be delivered to them. They also hold the stock of Anaconda matte, 3532 tons fine, and a considerable quantity of other furnace material. Sales of furnace material have been very limited, but 764 tons of Anaconda matte have been delivered by the French

syndicate to the English smelters. English best selected ingots are held by those smelters who have signed the agreement with M. Secrétan at £82 per ton, but sales have been made in Birmingham by smelters who have not done so at £79 per ton. So much old copper has been offered for sale that consumers and manufacturers have required to take very little copper from smelters.

The annual report of the Tharsis Sulphur and Copper Company for the past year states that the quantity of mineral raised at Tharsis and Calañas in 1887 was 635,215 tons, against 573,446 tons in 1886, and that there will be a large increase in the mineral production of the Calañas mine in 1888. The shipments of pyrites were 282,653 tons, against 273,298 tons in 1888, and of precipitate 6390 tons, against 6463 tons in 1886. The directors state that they have contracted with the Société des Métaux for the purchase of all the company's production of copper for the years 1888, 1889, and 1890. The dividend declared for the year 1887 is 10 per cent, against 7½ per cent for 1886. The Rio Tinto Company have declared a dividend of 17s. per share (£10) for the last half of 1887, making, with the dividend of 3s. for the previous half year, 10 per cent for the year 1887, against 3 per cent for 1886.

Mason & Barry's dividend is 8s. for the last half of 1887, making 5 per cent for 1887, against 2½ per cent for 1886. The Secretary announces that a contract was signed on the 19th ultimo, between the company and the Société des Métaux for the sale, at a fixed price, of the company's shipments of copper precipitate from that date to the end of 1890, after deducting such quantity as may be required during the remainder of this year for completing contracts previously entered into. The report is not yet issued.

The Panulcillo Copper Company, of Chili, have declared a dividend of 10 per cent for the year 1887. The report states that negotiations with the French buyers for a contract are on the point of completion.

At Boleo the "Port Gordon" was loading three weeks ago 1200 tons of 75 per cent matte and 600 tons of bars.

Imports for the past four months have been 21,485 tons greater than during the same period last year, and deliveries have been 7665 tons less. Stocks have increased 22,986 tons since January 1st.

The production for April of the Old Dominion Copper Company, of Arizona, is reported to have amounted to 280 tons.

The exports of copper from New York during the week were as follows:

To Liverpool—	Copper matte.		Lbs.	
By S. S. Spain	Sacks	4,634	557,970	$28,000
" Vandyck	Bbls.	181	180,995	10,000
To Hamburg—				
By S. S. Gillert	"	4	3,322	800
To Hamburg—	Copper.			
By S. S. Taormina	Casks	5	6,250	1,050
To Antwerp—				
By S. S. Waisland	Bbls.	30	37,500	6,200
To Liverpool—	Old Copper.			
By S. S. Arabic	....		3,000	150

Tin.—This market is quite lifeless, and although it still attracts a good deal of attention yet as far as actual business is concerned it has been almost entirely suspended, no one buying more than to meet pressing needs. A good deal of uncertainty still exists as to the course the market is likely now to take, but the general feeling appears to be that we may see lower prices yet. Rather considerable quantities are offered on this market on the parity of the London quotations, and we don't think we are wrong in believing that these offers are being made on account of the syndicate. We close to-day at the following quotations: Spot, 22; May, 21·25; June, 19·25; July, 19·25. London quotations are: Spot, £84 15s.

Lead.—A further decline has taken place in the price of lead, which we think might fairly be regarded as only natural, and what might be expected, judging the market on its real merits. Comparatively little business has been done during the week, and prices have gradually declined to 4·05, at which quotation we close. The general position of this market is far from encouraging to holders of the metal. Very large stocks remain in speculative hands, and these stocks are stored in this city and while they remain unabsorbed by consumers they will continue to exert a depressing influence, and will prevent any improvement in values. During the week, of the Western markets, St. Louis has suffered the most. For a long time past that market has not been so much influenced by the decline in New York as in the early part of the week, when, owing to heavy sales, lead could be purchased there on a parity with New York quotations, while for some months past prices there have been maintained considerably higher than the New York parity. Comparatively little of the metal is being offered for sale by smelters at present prices, but it is only to be expected that the slightest advance would bring out offers of large quantities. Our cable advices report a very weak foreign market. Spanish lead has declined from £12 15s. to £12 2s. 6d., its present quotation.

Messrs. John Wahl & Co., of St. Louis, telegraph to-day as follows: In sympathy with other markets, an increasing dullness has characterized our lead market. There has been a weak feeling all around, carrying down the prices to 3·90c. for Common, and 3·95c. for Refined.

Messrs. Everett & Post, of Chicago, telegraph to-day as follows:

Prices are declining quite rapidly, and the market is very flat and weak. Scarcely any thing is offered. Prices are nominally 4.

Spelter is flat, with a very poor demand. Domestic is offered at 4·50, and Foreign at 5·50.

Antimony.—Rather lower, with Cookson's quoted at 13, and Hallett's at 10¼.

Chemicals.—The market does not present many noticeable points, though the general tone is quite firm and the volume of business good. In most cases the firmer feeling is due to the increased ocean freights and the small spot stocks, and not to any increased demand for goods.

Carbonated soda ash, 48 per cent, is not very active, most of the business transacted being of a jobbing character. The stock on the spot is very small, and nothing can be had for immediate delivery under 1·35. The slightly easier feeling noted last week has passed, and the market has stiffened a little; near by lots may be had for 1·30@1·32½, and limited offerings of future shipment are made at 1·25. There is very little doing in high test, and no quotable change in quotations, which are more or less nominal at 1·15.

Caustic soda ash, 48 per cent, continues in fair demand, and as the stock here is very light, as high as 1·35 is realized for small lots. Lots to arrive are quoted at 1 25@1·27½, and a fair amount of business is done at these figures.

Refined alkali, 36 per cent, continues dull, only small sales being made. The quotation 1·15 is more or less nominal. In high test we hear of nothing worthy of note, holders' views apparently being above the ideas of consumers.

Caustic soda continues dull and easier. We hear of no sales outside of the jobbing business necessary to supply consumers' immediate wants. There is no change in quotations—60 per cent offering at 2·40@2·50; 70 per cent, 2·30, and 72@74 per cent at 2·20@2·22½.

Bleaching powder is not attracting any attention in this market. Despite the lack of important demand the prices remain quite firm, and nothing is obtainable below 1·85, ranging from this figure to 1·95, according to quantity, holder, etc.

The acid market pursues the even tenor of its way without change. Acetic acid is moving fairly, with no change in quotations, which are steady at 2⅝@2½.

Sulphuric acid, 66 degrees, is fairly active, and prices rule unchanged, 90c. to $1 for large lots, and $1.05@$1.15 for smaller quantities.

Nitric and hydrochloric acids are quite active and prices, as quoted in our list, are well maintained.

Oxalic acid is without change. There is little demand except to supply current consumption. The prices still remain the same, 6½c. for large quantities and 7c. for smaller lots.

The fertilizing chemical market has subsided after an unusually active season, and things are once more in their normal position. It is a little too early yet for fall business, and the market is rather dull, though small stock in most lines prevents any falling off in price.

We continue our quotations of dried blood, 2·25@2·30 per unit for high grade, and 2·20@2 25 for low grade. Tankage, high grade, $21@$21.50; low grade, $18.50@$19. Refuse bone, black, $16.50@$17 per ton. Ground steamed bones, $25@$27 per ton. Fish scrap f.o.b. factory, $25 per ton.

Sulphate of ammonia is quite scarce and is quoted at $3.25@$3.30 per cwt.

Muriate of potash is very firm and the demand good, we continue to quote $1.80 for spot lots, $1.77½ to arrive by steamer, and $1.72½ for future sail shipments.

Kainit is in good demand for future shipment, and considerable business has been transacted at our former quotations. There is nothing whatever here, and in the entire absence of business it is, of course, impossible to give spot quotations.

Double manure salt is not wanted to any extent, and the quotations of 1·10@1·15 are nominal.

Nitrate of soda is very firm and the market has an upward tendency. The spot quotation from vessel or ex store is 2·05c. We hear of nothing offering below this figure. Considerable business is done in futures, though nothing is now offering below 2c., which is the quoted price for lots to arrive.

Brimstone is firmer though the market is not very active. Holders' views are strengthened by the advancing freight rates, and nothing is now offering on the spot below $20.50, ranging from that figure to $21.00, according to quantity, etc. Shipments to arrive are quoted at $20 50, and we hear of some sales at this figure. For future shipment nothing is obtainable below $19.50 for best unmixed seconds. Thirds are quoted at half a dollar less.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 11.

The drooping and unsatisfactory condition of the pig-iron market has at last led to a definite move on the part of the Thomas Iron Company. Mr. B. G. Clarke, with characteristic pluck, "took the bull by the horns," and announced last Tuesday a general reduction of prices of pig-iron at tidewater to $18, $17, and $16 for No. 1, No. 2, and Gray Forge, respectively.

This reduction applies to all running contracts for 1888 delivery. It was made necessary by the unsettled state of the market, owing to continued concessions on the part of Western and Southern makers to force their iron into this market. Northern makers have generally met this reduction fully half-way, but the present cut cannot be borne by the majority of Northern makers, and the near future will doubtless witness the going out of blast of many furnaces which usually supply this market. Already the Coplay Iron Company have stopped the one furnace which they were still running.

The effect on the demand can not yet be noticed, if any thing it is thus far depressing. Mr. Clarke, however, announces that the prices he has named are to his regular customers only, who take all of his company's product.

The sellers of Southern iron in this market will meet the price, and profess entire willingness to meet any prices which the Thomas Company or any other Northern maker of standard brands of pig-iron name. Indeed, many of the contracts for Southern irons have been made on the basis of a fixed ratio to the prices fixed by the Thomas Company, generally at a certain amount per ton below those prices.

The conclusion of the whole matter is that even the restricted production of the past few months has been an over-production. As yet buyers have not begun to move, and there has been no appreciable effect on demand. Doubtless there will be further waiting to see whether bottom has really been reached.

So far as Southern opinion on the reduction has been obtained, it goes to indicate that the reduction is fully $1 per ton below what they would have preferred. But it will now be claimed that the present condition of things is only an index that the center of iron production is surely gravitating towards the South.

Scotch iron has been in a trifle better demand. Quotations are unchanged here, although again lower in Glasgow.

Bessemer pig is very quiet and nominal.

Steel blooms are practically out of the market at the present price of rails.

The sales of steel rails to May 1st amount to 721,000 tons. No new orders of any size have been placed, and the market has been very quiet.

In a letter of Mr. Andrew Carnegie to Mr. James F. Swank, of the American Iron and Steel Institute, published in a daily paper, Mr. Carnegie is quoted as saying that the present price of steel rails is $30 at mill. This is doubtless an error, as we are assured that $31.50 is the lowest price at which rails have been sold at Pittsburg.

The business in structural iron continues excellent, and several large orders have recently been placed, including the iron for the Brooklyn Bridge extension.

Old rails have been in more active demand during the past few days, and there have been sales of lots of tees at prices from $20 to $20.50, and of doubles at $21. Stocks are diminishing, although there are fully 12,000 tons in store, many of these in the hands of strong holders who will not sell at present prices.

The Bulletin of the Iron and Steel Association publishes the following table of imports of iron and steel and iron ore for the first quarter of 1888:

First quarter, 1888, pig-iron, 48,748; old and scrap iron, 17,455; scrap steel, 2277; bar iron, 5797; iron rails, none; steel rails, 31,744; cotton-ties, 111; hoop and scroll iron, 238 pounds; steel plates, etc., 6998; steel blooms, etc., 25,269; sheet and plate-iron, 2453; tinplates, 63,690; wire rods, 31,844; wire and wire rope, 714; anvils, forgings, etc., 381; chains, 303; total, 237,784; iron ore, 175,284. The total foreign value of our imports of iron and steel in the first quarter of 1888, excluding iron ore, was $10,543,701, against $12,489,698 in the first quarter of 1887.

The Collector of Customs at New York has been informed that the Treasury Department holds that paragraph 167 of the tariff, for "forgings of iron and steel of forged iron," applies only to forgings of iron and to forgings of iron and steel combined, and not to forgings of steel alone.

Iron Ore Market.

Ore from the Cleveland mine, Marquette district, was sold during the week at $5.25 per ton at Cleveland. Sales of Menominee Range ores this week will aggregate 100,000 tons. Furnacemen are offering $5 for Gogebic Bessemers, and expect to buy at that price. Colby mine ore is reported as sold at $4.75, but as a rule $5 may be quoted as the selling price of Gogebic Bessemer ore, and Menominee non-Bessemer from $3.25 to $4.25. Specular and Magnetic Bessemer ores are held at $5.75@$6.

The Cleveland *Iron Trade Review* of the 10th inst. publishes its customary annual statement of the amount of iron ore on dock at Lake Erie ports, at the opening of navigation this year, in comparison with previous years. Summarized, the figures show the following to be the condition of affairs:

	Gross tons.
On dock at Lake Erie ports at the close of navigation, December 1st, 1887	1,558,861
On dock at the opening of navigation, May 1st, 1888	703,720
Total shipments to furnaces during winter of 1887-8	855,141

Winter shipments in		Winter shipments in	
1886-7	817,168	1884-5	1,285,220
1885-8	1,090,648	1883-4	1,303,950

The following table gives the data in detail:

Port.	Close of navigation.		Opening of nav'g'n.	
	Dec. 1, 1886.	Dec. 1, 1887.	May 1, 1887.	May 1, 1888.
Toledo	15,000	50,000	14,000	19,200
Sandusky	80,000	65,000	10,000	50,000
Huron	8,500	11,700	None	8,381
Lorain	69,304	110,000	18,000	22,167
Cleveland	464,971	487,327	71,337	244,297
Fairport	7,000	223,318	3,500	80,000
Ashtabula	285,697	522,516	32,026	2 9,675
Erie	36,000	89,000	441	40,000
Buffalo	None.	None.	None.	None.
Total	966,472	1,558,861	149,304	703,720

The total amount of iron ore on dock at Lake Erie ports, at the opening of navigation for the past

years, according to the *Iron Trade Review's* figures, has been as follows

Year.	Gross tons	Year.	Gross tons.
1883	524,749	1886	313,321
1884	388,739	1887	149,304
1885	556,657	1888	703,729

It will thus be seen that the amount of ore on dock at the opening of navigation in 1888 is the largest of any year covered by reports to the *Iron Trade Review*, being nearly five times the surplus of last year.

Louisville. May 15.

[Reported by HALL BROTHERS & Co.]

The market has improved materially, so far as the volume of business is concerned, but prices still continue irregular and unremunerative to the furnaces. We can report sales in lots of 100, 300, 500, 800 and 3000 tons, mostly for deliveries beginning in September and October, although on the smaller orders the deliveries continue from now on. Only a few furnaces, however, can make any early shipments of any regular grade; especially is this true of foundry iron. The action of the buyers in anticipating their wants so far ahead is good evidence of their belief that prices have about touched bottom. Quotations will be found in our weekly register of prices.

Pittsburg. May 17.

[From our Special Correspondent.]

We regret to say that there is no improvement in the condition of the iron market. It continues extremely dull, with prices uncertain and nothing in sight likely to improve its condition for some time to come. At the extremely low prices now current, it seems almost impossible for the market to decline much further; but in spite of that, it may be some time before any permanent improvement is inaugurated. We have heard nothing further in regard to Southern iron being offered in this market at very low figures. The report was no doubt gotten up for a purpose, and so far as this market was concerned, a failure. Eastern dispatches state that Southern forge had been offered at $16 cash, and No. 1 Foundry $18. These prices are from $1 to $1.25 per ton above Pittsburg prices; in fact, published sales show conclusively that iron can be purchased here at extremely low figures, that ours is unquestionably the market for buyers to supply their wants. Several furnaces in this vicinity are still "banked," and will so remain until the workmen offer such terms as the owners can accept. The labor troubles are being adjusted slowly. The Edgar Thomson works are in full operation in all departments. The Knights of Labor have lost control, and have to work along with men that don't belong to the order or remain out in the cold. The late strikes have proved beyond doubt that the mill owners will no longer hand over the control of their works to others. The next trouble will be the signing the scale, that will come up for consideration June 1st. The report is current that the men will ask an advance; on the other hand it is said the mills will close unless the scale is shaded down materially. The next thirty days will decide this question. Let us hope that wise councils will prevail.

The following sales fully describe the market:

Coke and Coal Smelted Lake Ore.

1000 Tons No. 3 Bessemer ..... 16.50 cash.
1000 Tons Bessemer ..... 16 66 cash.
500 Tons Gray Forge ..... 14.75 cash.
500 Tons No. 1 Mill ..... 15.25 4 mo
500 Tons Gray Mill ..... 14.75 cash.
500 Tons Bessemer ..... 16.65 cash.
100 Tons Gray Forge (Storage) ..... 14.00 cash.
100 Tons Gray Forge (Storage) ..... 14.25 cash.
50 Tons No. 2 Foundry ..... 16.50 4 mo.
50 Tons No 1 Foundry ..... 17.00 cash
50 Tons No. 2 Foundry, all ore ..... 16.25 cash.

Coke, Native Ore.

400 Tons Gray Forge ..... 14 87 cash.
200 Tons Gray Forge ..... 14.87 cash.
150 Tons Gray Forge ..... 15 00 cash.
150 Tons Gray Forge ..... 14.75 4 mo.
50 Tons Silvery ..... 17.00 cash.

Charcoal.

100 Tons Cold Blast ..... 26.00 4 mo.
50 Tons Cold Blast ..... 26.00 cash.
30 Tons No. 1 Foundry ..... 23.50 4 mo.
25 Tons Cold Blast ..... 25.00 cash.

Steel Slabs and Billets.

1000 Tons Nail Slabs ..... 27.75 cash.
500 Tons Billets ..... 28.00 cash.
350 Tons Billets ..... 28.25 cash.

Muck Bar.

500 Tons Neutral, May ..... 26 85 cash
500 Tons Neutral, June ..... 26.75 cash.

Steel Crop Ends.

500 Tons Crop Ends ..... 18.25 cash.

Steel Wire Rods.

350 Tons American ..... 41.50 cash.

Old Iron Rails.

650 Tons American T's ..... 22.50 cash.
350 Tons American T's ..... 22.25 cash.
300 Tons American T's ..... 22.50 cash.
750 Tons old Steel Rails ..... 20.00@20.50 cash.

Scrap Material.

450 Tons No. 1 W. Scrap, net ..... 20.00 cash.
250 Tons Old Car Wheels, net ..... 20 00 cash.
150 Tons Cast Scrap, gross ..... 16.50 cash.
100 Tons Old Axles, net ..... 26.50 cash.
100 Tons Cast Borings, gross ..... 12.50 cash.

Philadelphia. May 18.

[From our Special Correspondent.]

The reduction in pig-irons by the the Thomas Iron Company is something of a surprise, although prices have been shaded for some weeks. Quotations are $16, $17 and $18 for Thomas iron. Other brands have not broken yet, though it is strongly intimated this afternoon that announcements will be made to-morrow of reductions by other furnace companies. During the past forty-eight years a good many rumors have been circulated as to probable reductions, but there is a strong feeling among the furnace companies to submit to the drop that to all appearances seems inevitable. The fact that stocks are of limited proportions is in favor of makers. Buyers are even less inclined to buy than heretofore, as prices are more unsettled and large transactions will not be closed until bottom prices are definitely fixed. To-day, offers were made at $18.50 for No. 1, good brands, and are now under consideration. Very little is doing in Southern irons, but Southern furnace agents predict large sales during the next thirty days. No sales of foreign material have been reported. Domestic bloom makers have a fair run of business, at steady prices. A few trifling lots of muck bars have been sold at the usual low figures. Merchant bars are dull and low. Mill owners complain and see no prospects for better trade earlier than July. Agents are scouring the markets for business to keep mills going. There is no change in the nail trade. Some of the promised business in skelp iron has come to hand and more will be closed in a few days. Plate and tank iron makers are anxious for business, and at the low prices a fair improvement in business has been shown. Local structural mills have not participated largely in the two or three large orders that have been placed for bridge work. Orders for building requirements are numerous. No change in prices. Merchant iron is dull. A number of good-sized orders for wrought-iron pipe have come to hand, but the trade conditions, owing to the great capacity, have not improved. Steel rails are unchanged and business is moderate, and Pennsylvania makers are divided in opinion over the question of allotment. Rumors prevail of large old rail transactions elsewhere, but here business is light. Selected and No. 1 scrap have been going better and at yardmen's prices. Quotations will be found in our weekly register of prices.

FINANCIAL.

NEW YORK, Friday Evening, May 18.

The market continues to drag along in a dull and uninteresting way. The business has been smaller and prices continue to show a declining tendency.

The Security Mining and Milling Company has issued a circular, which shows that the company has a debt of $185,000 contracted for development, and shareholders are asked to contribute 25 cents per share. They are informed that unless this is done a reorganization will take place, in the interest of those who pay this voluntary assessment.

The stock this week was almost entirely neglected

IMPORTATIONS AT NEW YORK DURING 9 DAYS ENDING MAY 14, AND FROM JAN 1 TO SAME DATE.

	Week.	Year.
Spelter.	Tons.	Tons.
American Metal Co., Lt.		208
Friedensville Zinc Co.		24
Naylor & Co.		47
Osgood, F.		42
Total		320
Corres. date 1887	90	920
Zinc Sheets.	Tons.	Tons.
H. Lemanche's Sons		10
Naylor & Co.		25
Total		35
Nickel.	Lbs.	Lbs.
McCoy & S.		92,426
Total		92,426
Antimony.	Casks.	Casks.
Total	100	1,373
Corres. date 1887	200	1,588
Pig Lead.	Tons.	Tons.
Hendricks Bros.		100
Total		100
Corres. date 1887		50
Tin.	Tons.	Tons.
Abbott & Co., Jere.	253	3,448
American Metal Co.		31½
Bidwell & French		15
Crooke S. & R. Co.		91
Dickerson, Van Dusen		10
Hendricks Bros.		89
Muller, Schall & Co.		581
Naylor & Co.		t51
Phelps, Dodge & Co.		381
Schwarer Bros.		7
Thomson & Co., D.		114
Total	253	2,418
Corres. date 1887	141	4,288
Tin Plates.	Boxes.	Boxes.
American Metal Co.		141
Bruce & Cook	2,782	32,335
Byrne James		10,522
Central Stamping Co.	546	10,486
Coddington & Co., T. B.	2,496	56,562
Corbierre, Fellows & S.		783
Cort & Co., N. L.	5,970	43,890
Cons. Fruit Jar Co.		837
Crooks & Co, Robert	1,679	25,143
De Mill & Co., H. R.	941	6,275
Dickerson, Van Dusen	6,940	95,214
Dolly, T. G. F.		112
Iron Clad Mfg. Co.	81	81
Lalance & Gro-jean	147	593
Lombard, Ayres & Co.		4,000
Merchant & Co.	889	3 950
Mersick & Co., C. S.	1,010	2,890
Morewood & Co., G.	4,263	8.882
Naylor & Co.		8 869
Newall Bros.		158
Phelps, Dodge & Co.	7,569	161,720
Potts, W. A., Son & Co.		573
Pratt Mfg Co.	12,293	62,898
Shepard & Co., Sidney	1,950	52,375
Stroud & Co		342
Taylor, N. & G.		150
Thomsen & Co., A. A.	10,915	58,959
Warren & Co	150	1,065
Wheeler & Co.		225
Whittemore & Co., H.		22,876
Wolff & Reesing		14,507
Wright & Sons, Peter		165
Total	60,621	686,898
Corres. date 1887	42,947	626,987
Pig-Iron.	Tons.	Tons.
Abbott & Co, Jere		600
Baldwin Bros. & Co.		103
Bartlett & Co., N. S.	200	2,100
Crocker Bros.	100	4,300
Crooks & Co, R.		700
Dana & Co.		300
Downing & Co.		51
Drum'nd, McCall & Co.		10
Henderson Bros		775
Holt, H. N.		50
Lee & Co., James	100	200
Milne & Co., A.		796
Pierson & Co.		15
Sanderson & Sons		2
Stetson & Co., G. W.	1,250	8,540
Walbaum, W. H.		200
Williamson & Co., Jas.		1,800
Total	1,650	20,839
Corres. date 1887	4,097	44,851
Steel & Iron Rods.	Tons.	Tons.
Abbott & Co., Jere.	472	4,597
American Screw Co.		748
S. & I. Rods (*Con*).	Week. Tons.	Year. Tons.
Bacon & Co.		109
Carey & Moen		274
Cohn, M.		60
Dana & Co.		565
Downing & Co., R. F.		95
Galpin, S. A.		1,860
Heyn, A	25	1,326
Hugill, Chas.		33
Jacobus, E. Y.		12
Lazard Freres	50	50
Leng, J. S.		17
Lundberg, Gustaf		120
Milne & Co., A	2	1,308
Montgomery & Co.		48
Muller, Schall & Co.		150
Naylor & Co.	433	6,453
Newton, & S		2
N. Y. Barb Wire Co.		20
Page, Newell & Co.		152
Pierson & Co.		10
Pilditch, F. S.		11
Prosser, Thos		25
Roebling's Sons, J. A.	80	869
Sanderson & Son		67
Sheldon & Co., G. W.		11
Walschid C. A.		15
Washburn Mfg. Co.		35
Whittemore & Co.		1,350
Wolff & Co., R. H.		1,624
Total	1,062	22,016
Corres. date 1887	3,539	47,470
Steel Sheets, Billets, Forgings, etc.	Tons.	Tons.
Abbott & Co., Jere.	6	928
Arkell, Jas		17
Bowker, C. F.	4	109
Bruce & Cook		7
Carey & Moen		24
Cohn, M	11	72
Cooney, D. J		20
Crooks, R. & Co.	313	471
Crousbey, H.		236
Dana & Co		51
Downing & Co., R. F.	10	95
Henderson Bros.		10
Holt, H. N.		6
Hondolette & D.		68
Hugill, Chas.	5	50
Lalance & G. Mfg. Co.	6	137
Leng, J. S.	5	15
Littlejohn, Jas.		40
Mersick & Co.	8	124
Milne & Co., A.	172	907
Montgomery & Co.	9	11
Moore's Son & Co.	25	25
Muller, Schall & Co.		5
Manns, J. & Son		10
Naylor & Co.	223	1,224
Newton & S.	8	29
Ogden & Wallace		87
Phelps, Dodge & Co.		3
Phœnix Steel Co.		20
Pierson & Co	39	224
Pilditch, F. S.	13	126
Power, C. W		27
Prosser, Thomas		804
Roebling's Sons, J. A.		98
Sanderson & Son		40
Shotts Iron Co.		15
Strouse & Co.		7
Temple & S.		2
Union Bridge Co	46	287
Wagner, W. F.	72	340
Walbaum, W. H.		2,479
Walschid, C. A.		
Wallace, W. H & Co.		15
Whitney & Co.		27
Wetherill & Co		2
Wolff, R. H		98
Total	915	9,392
Corres. date 1887	3,123	34,492
Bar-Iron.	Tons.	Tons.
Abbott & Co., Jere.	175	1,424
Abeel Bros.		3
Bacon & Co.		13
Downing & Co.		50
Jacobus, E. Y.	3	6
Lilienberg, N		5
Lundberg, Gustaf		112
Milne & Co., A.		95
Naylor & Co		25
Page, Newell & Co.	102	122
Philip, C. M		20
Wallace & Co., W. H.		12
Wilson, J. G		7
Totals	280	1,894
Corres. date 1887	67	3,027
Old Rails.	Week. Tons.	Year. Tons.
Baldwin Bros.		100
Bowening & Archibald		100
Brown Bros. & Co.		618
Crossman & Bro., W. H		1,000
Frankfort, M.		100
Geisenheimer & Co.		100
Henderson Bros	100	437
Neumark & Gross		1,012
Stetson & Co., Geo. W.		230
Waltam & Co.		300
Total	100	4,932
Corres. date 1887	8,366	86,020
Sheet Iron.	Tons.	Tons.
Coddington & Co.	46	657
Newton & S.		4
Wagner, W. F		40
Whitney & Co.		5
Total	46	706
Corres. date 1887	46	876
Scrap-Iron.	Tons.	Tons.
Brown Bros. & Co.		20
Burgess & Co.		172
Crossman, W. H. & Co.		47
Geisenheimer & Co.		565
Muller, Schall & Co.		15
Neumark & Gross		321
Purdon & W		75
Trowbridge & Co., D.		75
Ward & Co., J. E.		100
Total		1,390
Corres. date 1887	1,653	10,450
Charcoal Iron.	Tons.	Tons.
Lunberg, G.		16
Milne & Co.		15
Naylor & Co.		25
Page, Newell & Co.	96	141
Sanderson & Son		1
Total	96	198
Spiegeleisen.	Tons.	Tons.
Abbott & Co., Jere.		205
Arkell, Jas.		28
Crocker Bros.	26	1,030
Dana & Co.	200	251
Geisenheimer & Co.	150	178
Jansen, J. A.	10	9,963
Naylor & Co.	300	3,080
Perkins, C. L.		2,443
Pierson & Co.		1,045
Total	686	18,233
Corres. date 1887	1,350	35,685
Iron Ore.	Tons.	Tons.
De Flores, R.		2,304
Earnshaw, A.	295	4,473
Ennis & Co.		1,021
Johnston & Co	300	300
Naylor & Co.		2,706
Wright, Chas. L. & Co.		1,640
Total	595	12,434
Corres. date 1887	992	12,347

EXPORTS.

	Week.	Year.
Copper.	Pounds.	Pounds.
Abbott & Co	87,500	4,424,427
Amer. Metal Co	237,500	3,743,450
Becker, & Co., H.		1,250
Bridgpt. Copper Co		112,000
Copper Queen		224,034
Herold, Emil		250,000
Ismay, J. Bruce	3,000	115,000
Ledoux & Co.		110,276
Lewisohn Bros.		4,171,304
Lomal, F. A.		2,691,293
Mendel, S.		500,900
Muller, Schall		1,105,000
Neumark & Gross		120,143
Orford Co.		349,881
Parsons & Co.		67,500
Phelps, Dodge		230,664
Pope's Sons		1,282,530
Todd & Co.		112,026
Total	328,000	19,670,978
Corres. date 1887		3,252,658
Copper Matte.		
Abbott & Co		295,000
Amer. Metal Co.,		1,019,257
Ledoux & Co.		469,720
Lewisohn Bros.		1,004,480
Nichols & Co	180,995	516,783
Wilm's, Terhune		23,819,146
Total	180,995	27,124,496
Corres date 1887.		7,386,054

WEEKLY REGISTER OF

CURRENT QUOTATIONS.

CHEMICALS.

Acid—Acetic.....2¾@2¾
Muriatic, 18°, per 100 lbs.....1.20
Muriatic, 20°, per 100 lbs.....1.35@1.50
Nitric, 36°, per 100 lbs.....4.50@5.00
Nitric, 42°, per 100 lbs.....6.00
Oxalic.....6½@7
Sulphuric, 60°, per 100 lbs.....80
Sulphuric, 66°, per 100 lbs.....1.10
Alkali—36 p. c.....1.10@1.15
48 p. c.....1.22½@1.25
Refined, 58°.....1.15
Alum—Lump, per lb.....1¾
Ground, per lb.....2½
Lump per ton, Liverpool.....£5
Sulphate of Alumina, ℔ ton....£3 15
Aqua Ammonia—18°, ℔ lb.....4
20°, ℔ lb.....5
22°, ℔ lb.....6¾
26°, ℔ lb.....9¾
Ammonia—Sul., per 100 lbs. 3.00@3.50
Carb., per lb.....7¾
Muriate, per lb.....7
Arsenic—White, powdered, ℔ lb.3¼@3½
White, glass.....
Red, per lb.....6½
White, at Plymouth, per ton..£11 10
Asbestos—Am., p. ton.....$20@$100
Italian, p. ton, c. i. f. L'pool ...£18 0 0
Asphaltum—P. ton.....13.00
Prime Cuban, ℔ lb.....5@6c.
Hard, ℔ ton.....$28.00
Trinidad, refined, ℔ ton.....$30.00
Barytes—Sulph., Am. prime white16.00
Sulph., foreign, floated, p. ton....19.00
Sulph., off color, p. ton.....12.50
Carb., lump, f.o.b. L'pool, ton ..£6 0 0
No. 1, casks, Rancor " "£4 10 10
No 2, bags, Rancorn " " 3 15 0
Bleach—Over 35 p.c., ℔ lb.1.82½@1.95
Borax—Per lb.....7¾
refined at Liverpool, per ton.....£31
Brimstone—*See Sulphur.*
Bromine—Per lb.....36
Cement—Rosendale, per bbl.....1.00
Portland, American, per bbl.....2.00
Portland, foreign, per bbl.....2.25
Chalk—Per ton.....3.00
Precipitated, per lb.....4
China Clay—English, per ton....18.50
Southern, per ton.....13.50
Chrome Yellow—Per lb.....8
Cobalt—Oxide, per lb.....270
Copper—Sulph. English Wks., ton £23
Precip., Eng. Wks, unit..fluctuating
Copperas—Common, per 100 lbs.$ 65
Best, per 100 lbs.....1.90
Liverpool, per ton, in casks, £1 16 1.20
Cream of Tartar—Am. 99%....32@33¾
Powdered, 99 p c.....33½
Emery—Grain, per lb.....4
Flour, per lb.....2½
Feldspar—Ground, per ton.....14.00
Fuller's Earth—Lump, per bbl. 95
Powdered, per lb.....2
Gypsum—Calcined, per bbl.....1.25
Iodine—Resublimed.....3.60
Kainit—Per ton.....11.50
Kaolin—*See China Clay.*
Lead—Red, per lb.....6
White, American, in oil, per lb....6½
White, English, per lb.....7½
Acetate, or sugar of.....13@13½
Lime Acetate—Amer. Brown.1.50@1.55
" Gray.2.37½@2.40
Litharge—Powdered, per lb.....6@6¼
English flake, per lb.....9
Magnesite—Greek, per ton...10.00
Manganese—lump, c. i. f. L'pool.£ 15
Per unit, up or down.....18. 6d.
Ground.....£5 10
Mercuric-Chloride—(*Corrosive Sublimate*) per lb.....55
Mineral Wool—Per lb.....2
Mica—
in sheets according to size, 1st quality, ℔ lb.....25@$6 00
Phosphate Rock—S. Carolina, per ton f. o. b. Charleston.....5.80
Ground, f. o. b. New York..9.00@ 9.50
Canadian Apatite, lump, f. o. b. at shipping port, per unit.....24
Phosphorus—Per lb.....65
Piumbago—Ceylon, per lb....4@5
American, per lb.....5@7
London, per cwt.....£0 15 0
Potassium—Cyanide, per lb....39@41
Bromide, per lb.....37
Chlorate, per lb.....15¼@15½
Carb. per lb.....5
Caustic, per lb.....7½
Iodide.....2.70@2.75
Muriate, per 100 lbs.....1.77½@1.80
Nitrate, refined, per lb.....6
Bichromate, per lb.....10½
Sulphate, per 100 lbs.....1.10
Yellow Prussiate, per lb.....19
Red Prussiate, per lb.....42
Pumice Stone—Select lumps, lb. 3@5
Original cks., per lb.....1¾
Powdered, pure, per lb.....2
Pyrites—Non-cupreous, p. unit, s. 14
Quartz—Ground, per ton.....18.00
Rotten Stone—Powdered, per lb. 8½
Lump, per lb.....5
Eng., powdered, per ton.....£4
Lump, per ton.....£5
Salt—Liverpool, ground per bbl. 70
Turk's Island, per bbl.....25
Salt Cake—Per 100 lbs.....50
Saltpeter—Crude, per lb.....4½
Refined, per lb.....6
Soda Ash—Carb.,48 % 100 lb...1.95 @1.30
Caustic, 48 %.....1.22½@1.25
High test.....1.12½@1.15
Soda Caustic, 60%.....2.40@2.50
" " 70%.....2.25
" " 74–5%.....2.20
Sal, English, per 100 lbs.....1.10@
Sal, American, per 100 lbs.....1.15
Nitrate, per 100 lbs.....2.05
Strontium—Nitrate per lb.....10½
Sulphur—Roll, per lb.....1¾
Flour, per lb.....2
Crude Brimstone, 2s., ℔ ton...20.50@21
Crude Brimstone, thirds, per ton 19.00
Talc—Ground French, per lb..1¼
Domestic, per lb.....6
Domestic, per ton.....15.00
c. i. f. Liverpool, per ton.....£4 5 0
Tannin—Pure, per lb.....
Vermillion—American, per lb...50
English, per lb.....65
Vitriol—(Blue), Ordinary, per lb..5½
Extra, per lb.....6
Zinc Oxide—Am., Dry, per lb....4½
Antwerp, Red Seal, per lb.....6@6½
Paris, Red Seal, per lb.....6¾@7
* Spot.

BUILDING MATERIAL.

Bricks—Pale, per 1,000.....5.00
Jerseys, per 1,000.....7.50
Haverstraw, per 1,000.....8.50
Front bricks, per 1,000, from.....10.00
Building Stone—Amherst free-stone, per cu. ft., from.....75
Brownstone, per cu. ft., from.....1.00
Granite, rough, per cu. ft., from..45
Slate—Purple and green roofing, per 100 ft.....6.00
Red roofing, per 100 sq. ft.....15.00
Black, roofing, per 100 sq. ft.....5.00

THE RARER METALS.

Aluminum—(Metallic), per lb...11.00
Arsenic—Metallic, per lb.....32
Barium—(Metallic), per lb.....975.00
Bismuth—(Metallic), per lb.....2.40
Cadmium—(Metallic), per lb.....1.45
Calcium—(Metallic), per oz.....150.00
Cœsium—(Metallic).....
Cerium—(Metallic).....160.00
Chromium—(Metallic), per lb...200 00
Cobalt—(Metallic), per lb.....6 00
Didymium—(Metallic), per oz ..160 00
Erbium—(Metallic), per oz.....140.00
Gallium—(Metallic), per oz 3250.00
Glucinum—(Metallic).....4.50
Indium—(Metallic), per oz.....158.00
Iridium—(Metallic), per lb.....700.00
Lanthanum—(Metallic), per oz.175.00
Lithium—(Metallic), per oz.....160.00
Magnesium—Per lb.....4.50
Manganese—Metallic, per lb...1.10
Molybdenum—(Metallic), per oz. 6.00
Nickel—(Metallic), per lb.....65
Niobium—(Metallic), per oz.....128.00
Osmium—(Metallic), per lb 640.00
Palladium—(Metallic), per lb...512.00
Platinum—(Metallic), per lb. ..128.00
Potassium—Metallic, per oz....2.00
Rhodium—(Metallic), per lb....512.00
Ruthenium—(Metallic), per oz.112.00
Rubidium—(Metallic), per oz...200.00
Selenium—(Metallic), per oz....3.00
Sodium—(Metallic) per lb.....4.50
Strontium—(Metallic), per oz..128.00
Tantallum—(Metallic) per oz...144.00
Telurium—(Metallic) per oz....9 00
Thallium—(Metallic) per oz.....3.00
Titanium—(Metallic) per oz....32.00
Thorium—(Metallic) per oz.....272.00
Tungsten—(Metallic) per oz.....1.25
Vanadium—(Metallic), per oz..320.00
Yttrium—(Metallic), per oz 144.00
Zirconium—(Metallic), per oz..240.00

METALS.

Aluminum—
Bronze (10 %), ℔ lb.....46c.
Copper—
Lake Ingot, Spot, ℔ lb....16·75@16·85c.
Electrolytic, ℔ lb.....16·50c.
Casting Brands, ℔ lb. ...15·85@15·80c.
Chili Bars, London, ℔ ton.....£82 10s.
Sheet Copper (according to size), ℔ lb.....25 @38c.
Lead—
Domestic, Common, Spot....4½@4·20c.
Foreign.....4·80@4·85c.
Sheet, ℔ lb.....6½@6·60c. net
Pipe, ℔ lb.....6c. "
Tin lined Pipe, ℔ lb.....12c.
Shot, ℔ lb.....6 @ 7c.
Tin—
Tin Plates.....14s. 6d.
Tin Spot.....£84 15s.
Banca pigs, ℔ lb.....21·50c.
Zinc—
Domestic spelter, ℔ lb....4·55@4·65c.
Foreign spelter, ℔ lb....5·50@5·60c.
Silesian, ton.....£17 10s.
Sheet, American, ℔ lb.....6¼@6½c.
Antimony—Hallet's, per lb.10½@10¾c.
Cookson's, per lb.....13
Star Antimony.....£44
Quicksilver—Per lb.....61@63c.
London, ℔ flask.....£7@£7¼

IRON AND STEEL.

American Pig-Iron.
No. 1 X.....$18 00@..... at tidewater
No. 2 X.....$17.00@..... " "
Forge.....$16.00@..... " "
Scotch Pig—Coltness...$20.25@.$20.50
Clyde.....
Dalmellington.....18 50@ 18.75
Summerlee.....20.00@ 20.25
Shotts.....20.25@ 20 50
By Cable to-day to the Metal Exchange:
Scotch Warrants.....37s. 11d.
Coltness, at Glasgow.....47s. 6d.
Langloan, at Glasgow.....45s.
Summerlee, at Glasgow.....47s.
Gartsherrie, at Glasgow.....44s. 6d.
Glengarnock, at Aidrossan.....43s. 6d.
Dalmellington, at Ardrossan.....39s. 6d.
Eglinton, at Ardrossan.....38s. 6d.
Bessemer Pig—
Foreign, nominally.....$19.00
Domestic.....18@18.50 at furnace
Spiegeleisen—
German, 20 per cent.....$26.50
English, 20 " " .....$26.50@ 27.00
" 30 " " .....31.00@ 31.50
Ferro Manganese.....50.50@ 51.00
Steel Blooms, nominally.....@.....
Steel Billets, " 29.50@.....
Steel Nail Slabs, " 30 00@.....
Steel Wire Rods, " 40.50@ 41.00
Steel Rails—
Heavy sections, at mill....$30.50@ 31.50
Light " " .... 31.50@ 36.50
Structural Iron and Steel—
Bridge Plate, at mill.....2·00@2·1c.
Angles, at mill.....2·10@2·15c.
Tees, at mill.....2·40@2·50c.
Steel Angles, at mill.....2·20@2·30c.
Beams and Channels, on wharf, 3·3c. base.
Steel Plates—
Tank and Ship, on wharf.....2 3 @2·5
Boiler Shell, on wharf.....2·75 @2·8
" Flange, " .....@3
" Fire-Box, on wharf.....3¾ @4
Iron Plates—
Common tank, on wharf....2·05@2·15c.
Refined tank, on wharf.....2·2@2·4c.
Boiler shell, " ....2¼@
Boiler flange, " ...3¼@
Extra flange, " .....3¾@4
Bar Iron—
Best refined.....2@2·1c. base.
Refined.....1·9@2c. "
Common.....1·7@1·8c. "
Merchant Steel—
American tool.....8½@10c.
Special grades.....13 @20c.
Crucible machinery.....5 @6c.
" spring.....4½c.
Bessemer machinery.....2·2@2·5c.
" spring.....2·7@2·9c.
Cast-Iron Pipe—
According to size.....$26 00@$32.00
Wrought-Iron Pipe—nominally—
Butt-Welded, Plain and Tarred, 47½ per cent disc.; Galv., 37½ per cent disc.
Lap-Welded, Plain and Tarred, 60 per cent disc.; Galv., 45 per cent disc.
Boiler Tubes—Per cent disc.....60%
Rail Fastenings—
Spikes.....2 @2·1c.delv'd
Angle Fish-bars.....1·8 @1·9c.
Bolts and Sq. Nuts.....2·7 @2·8c.
" " Hex. " .....3 @
Wrought Scrap—
Foreign, *ex store*.....$19.00@$20.00
No. 1 Yard *to vessel*.....19.00@ 19.50
Cast Scrap.....15.50@ 16.50
Old Car Wheels.....@ 19 50
Old Rails—Tees.....20.50@
—Doubles.....21.00@
Nails—In car-load lots....1·90@1·95c.
—From store.....2·00@2·10c.

Louisville Prices.

Hot Blast Irons—
So. Coke, No. 1.....$17.50@$18.00
" " No. 2.....16.50@ 17 00
" " No. 2½.....16.00@ 16.50
Mahoning Valley (Lake Ore Mixture).....18.75@ 19.25
So. Charcoal, No. 1.....18.50@ 19.00
" " No. 2.....17.50@ 18.50
Missouri Charcoal No. 1....20.00@ 20.50
" " No. 2....19.00@ 19.50
Forge Irons—
Neutral Coke.....$14.50@$15.00
Cold Short.....14.00@ 14.50
Mottled.....13.00@ 13.50
Car Wheel and Malleable Irons—
Southern (standard brands).$23.00@$24 00
" (other brands).....19 00@ 20 00
Lake Superior.....23.00@ 24.50

Pittsburg Prices.

Coke or Bituminous Pig—
Foundry No. 1.....$17.00@17.25
Foundry No. 2.....16.00@16.25
Gray Forge No. 3.....14.75@15.00
" " No. 4.....14.50@14.75
White.....14.25@14.50
Mottled.....14.50@14.75
Silvery.....16.50@18.00
Bessemer.....16.50@17.00
Charcoal Pig—
Foundry No. 1.....23.50@24.50
Foundry No. 2.....22.50@24.00
Cold-Blast.....25.00@26.00
Warm-Blast.....24.00@25.00
20 p. c. Spiegel.....27.50@28.00
Muck-Bar.....26.75@27.00
Steel Blooms.....28.00@28.50
Steel Slabs.....27.75@28.00
Steel Crop Ends.....18.00@.....
Steel Bloom Ends.....@17 50
Steel Billets.....28.00@28.50
Old Iron Rails.....22.00@23.50
Old Steel Rails.....20.00@20.50
No. 1 W. Scrap.....19 00@19.50
No. 2 W. Scrap.....18.00@18.50
Steel Rails.....*31.50@32.00
" light sections.....*33.00@34.00
Bar Iron, nominal.....1.75@ 1.85
Nails.....$1.90 usual discount
Steel Nails.....$1.90
Two per cent off for cash.
* At works.

Philadelphia Prices.

Foundry No. 1.....$18.00@19.50
Foundry No. 2.....17.00@18.50
Gray Forge.....15.50@16.50
Bessemer Pig.....19.50@20.00
Steel Rail Blooms.....29.50@ nom.
Foreign Bessemer.....19.50@20.00
Spiegeleisen.....26.50@27.00
Scrap, Selected.....22.00@22.50
No. 1.....21.00@20.00
Cargo Scrap.....21.00@20.50
Muck-Bars.....27.50@.....
Merchant Iron.....1.75@ 1.95
Plate Iron.....2.00@.....
Tank Iron.....2.00@ 2.10
Skelp Iron.....1.80@ 1.90
Angles.....2.00@ 2.10
Beams and Channels.....3.30@.....
Nails.....1.90@ 2.00
Steel Rails.....31.50@33.50
Old Rails.....21.00@22.00

STOCK MARKET QUOTATIONS

Baltimore, Md.

COMPANY.	Bid.		Asked.	
Atlantic Coal	$1.50			$1.60
Balt. & N. C.	.31@	.32	.39@	.40
Big Vein Coal				
Conrad Hill	.05@	.08		.10
Diamond Tunnel				
George's Crk. C.	100@102		101@110	
Lake Chrome	.05			.11
N. State, Balto.	.25			.30
Ore Knob	.05			.11
Silver Valley	.50@.95			

Highest and lowest prices bid and asked during the week ending May 17th.

Birmingham, Ala.

COMPANY.	Bid.		Asked.	
Ala. Conn. C.				45
Bir. Min. & Mfg.			192½@195	
Bir. Fur. & Mg.				25
Broken Arrow C. & M.	5	@ 6¼	10	@ 15
Corona C. & C.	15	@27		
Decat. L. Imp. & Fur.	19	@19⅝	19½@	20½
Decatur Min. L.				27
Enterprise Mfg Co				50
Jagger-Townley C & C. Co.			11½@12	
Mag-Ellen Co., Mg		30		
No Bus. Crk., C. & Mg.	4½	@ 5	7½@	12
Pioneer M. & Mfg		11¾		13¼
Sloss I. & S.				
* Sloss I. & S.		75		81½
Sheffield C. & I.	65	@68	69½@	73
Tenn. C. & I. Co.	25	@25½		27¼
*Williamson Fur.				162
Woodstock S. & I	53	@55⅝	56 @	58

* Bonds.

Highest and lowest prices bid and asked during the week ending May 15th.

Pittsburg, Pa.

COMPANY	H.	L.	Closing
Allegegheny Gas.	35.00	35 00	35.00
Bridgewater Gas.	87.00	87.00	87.00
Charlotte Mg. Co.			
Chartiers Val. Gas.	81.00	80.00	81.00
Columbia Oil Co.			
Consignee Mg. Co.			
Forest Oil Co.			
Gogebic I. Syn.			
Iron City Mining.			
Kittanning Gas.			
La Noria Mining	3.50	3.00	3.50
Lustre Mining			
M'f'turers' Gas.	30.00	30.00	30.00
Nat. Gas Co. of W. Va.	65.00	65.00	65.00
N. Y. & C. Gas Coal	35.00	35 00	35.00
Ohio Valley Gas			
Pennsylvania Gas.	22.50	22.50	22.50
People's Nat. Gas.			
Philadelphia Gas.	48.00	46.63	46.88
Pine Run Gas			
Pittsburg Gas.	60.00	60.00	60.00
Silverton Mining.	3 00	1.75	2.00
South Side Gas.	38.00	38.00	38.00
Tuna Oil Co.			
Washington Oil	45.00	45.00	45.00
W't'h'se Air-Brake	125.00	118.00	125.00
West house Brake	65.00	65.00	65.00
Westmoreland & Cambria Gas.			
Wheeling Nat. Gas.	25.00	23.00	24.75
Yankee Girl Min.			

Highest and lowest prices bid and asked during the week ending May 17th.

Foreign Quotations.

COMPANY.	London. Highest.	May 5. Lowest.
Alturas Gold, Idaho	12s.	11s.
Arizona Copper, Ariz.	22s. 6d.	22s.
Birdseye Creek, Cal.	9s.	7s.
Carlisle, N. Mex	25s.	24s.
Centennial, Cal.	12s.	10s.
Colorado United, Colo.	4s 6d.	3s. 6d.
Columbian, S. A.	28s.	26s.
Denver Gold, Colo.	2s. 6d.	1s. 6d.
Dickens Custer, Id.	8s.	7s.
Eberhardt, Nev	2s.	1s.
El Callao, Venezuela	£3¾	£3⅛
Empire, Mont	£1½	£1⅝
Flagstaff, Utah	5s. 6d.	4s. 6d.
Garfield, Nev.	22s. 6d.	20s.
Gold Hill, N. C.	2s. 6d.	1s. 6d
Idaho	18s.	17s.
Ilex, Cal	20s.	17s. 6d.
Josephine, Cal	£1½	£1⅝
Kohinoor, Colo.	2s. 6d.	2s.
Lady Franklin N. Mex	8s.	6s
Mason & Barry, Portugal	£12⅝	£12½
Montana Lt., Mont	£2¾	£2
New California, Colo.	7s.	6s.
New Emma, S., Utah	6s.	5s.
New Hoover Hill, N. C.	2s. 6d.	2s.
New La Plata, Colo.	1s. 9d.	1s. 3d.
Pittsburg Cons., Nev.	45s.	42s. 6d.
Plumas Eureka, Cal.	£1	£¾
Quebrada, Venezuela	£5¼	£5⅛
Richmond Con., Nev.	£4½	£4¼
Ruby & Dunderberg, Nev	3s.	2s.
Russell Gold, N. C.	4s. 6d.	3s. 6d.
Sierra Buttes, Cal.	£¾	£⅝
Stanly, N. C.	£1	£¾
Tolima, Colombia, S.A.	£2½	£1½
Union Gold, Colo.	5s. 6d.	4s. 6d.
U. S. Placer, Colo.	£¾	£⅝
Viola Lt., Idaho	27s. 6d.	25s.
	*Paris.**	April 28.
Boleo	650	650
El Callao	87 50	87.50
Golden River	450	450
Lexington	75	75
" parts	3	3
Rio Tinto	526.25	526.25
" obligations	508.75	508.75
"	2d. 497.50	497.50
Tharsis	145	145

* France.

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and amount of last.		Dividends. Total paid.	Date and amount of last.		
1	Adams, s. L.	Colo.	$1,500,000	150,000	$10	*	....	....	$555,000	Jan.	1887	.10
2	Alice, s. C.	Mont	10,000,000	400,000	25	*	....	....	750,000	Sept	1886	.06¼
3	Alturas, G	Idah.	1,500,000	300,000	5	.....	....	.....	95,000	Sept	1886	.50
4	Amy & Silversmith, s.	Mon.	.....	341,419	....	.....	....	.....	247,530	Aug	1887	.12½
5	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	420,000	Feb.	1888	1.50
6	Argenta, s	Nev..	16,000,000	100,000	100	325,000	July	1885	.10	40,000	Feb.	1880	.20
7	Aurora, I.	Mich.	2,000,000	100,000	20	*	....	....	.....	155,000	Oct.	1887	1.87½
8	Bassick, G. S.	Colo.	10,000,000	100,000	100	*	....	....	.....	400,000	Mar.	1884	1.00
9	Belle Isle, s.	Nev..	10,000,000	100,000	100	145,000	Feb	1887	.20	300,000	Dec.	1879	.25
10	Belcher, G. S.	Nev..	10,400,000	104,000	100	2,666,000	Mar.	1888	.53	15,397,200	Apl	1876	1.00
11	Bellevue Idaho, s. L.	Idah.	1,250,000	125,000	10	57,500	Nov.	1887	.25	187,500	Jan	1887	.10
12	Big B'nd Hydraulic, G	Dak..	1,000,000	200,000	5	*	....	....	.....	253,000	Aug	1887	.03
13	Black Bear, G.	Cal..	3,000,000	30,000	100	32,500	Dec.	1884	.25	895,000	May	1883	.20
14	Bodie Con., G. S.	Cal..	10,000,000	100,000	100	450,000	Feb.	1888	.50	1,295,000	Apl.	1885	.50
15	Bonanza & Hecla, C.	C & M	3,000,000	300,000	10	*	....	....	.....	135,000	Oct.	1882	.15
16	Bonanza K'g, Cons. s.	Cal..	1,000,000	100,000	10	*	....	....	.....	185,000	Feb.	1885	.10
17	Boston & Mont, G.	Mont	2,500,000	250,000	10	*	....	....	.....	520,000	Jun	1886	.15
18	Breece, s.	Colo.	5,000,000	200,000	25	*	....	....	.....	2,000	Feb.	1880	.01
19	Brooklyn Lead, L. S.	Utah	500,000	50,000	10	*	....	....	.....	127,000	July	1887	.05
20	Bulwer, G.	Cal	10,000,000	100,000	100	80,000	May	1888	.20	175,000	Jan.	1884	.10
21	Caledonia, G.	Dak.	10,000,000	100,000	100	505,000	May	1885	.15	40,000	Feb.	1886	.10
22	Calumet & Hecla, C.	Mich	2,500,000	100,000	25	1,200,000	....	....	.....	29,850,000	Apl.	1888	5.00
23	Carbonate Hill, s. L.	Colo.	2,000,000	200,000	10	*	....	....	.....	80,000	Apl.	1884	.05
24	Caribou Con., s.	Colo.	1,500,000	150,000	10	*	....	....	.....	50,000	Mch	1880	.10
25	Castle Creek, G.	Idah.	100,000	100,000	1	*	....	....	.....	51,000	Oct.	1883	.03
26	Catalpa, s. L.	Colo.	3,000,000	300,000	10	*	....	....	.....	270,000	May	1884	.10
27	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,860,000	Feb.	1888	2.00
28	Christy, s.	Utah	10,000,000	100,000	100	*	....	....	.....	40,000	Jun	1885	.10
29	Chrysolite, s. L.	Colo.	10,000,000	200,000	50	*	....	....	.....	1,650,000	Dec	1884	.25
30	Colorado Central, s. L.	Colo.	2,750,000	275,000	10	*	....	....	.....	310,000	Jun	1888	.05
31	Confidence, s. L.	Nev..	.....	24,960	....	287,440	Apl.	1887	.50	49,920	May	1888	2.00
32	Cons. Cal. & Va., G. S.	Nev..	21,600,000	216,000	100	108,000	Jan.	1885	.20	1,792,800	May	1888	.50
33	Con. Gold Mining, G.	Ga..	500,000	100,000	5	*	....	....	.....	108,000	Nov.	1888	.02
34	Contention, s.	Ariz.	12,500,000	250,000	50	....	....	....	.....	†2,587,000	May	1888	.25
35	Crescent, s.	Utah	15,000,000	300,000	25	.....	....	.....	.....	210,000	Aug.	1886	.05
36	Crown Point, G. S.	Nev..	10,000,000	100,000	100	2,775,000	Apl.	1888	.50	11,588,000	Jan.	1875	2.00
37	Daly, s. L.	Utah	3,000,000	150,000	20	*	....	....	.....	600,000	May	1888	.50
38	Deadwood-Terra, G.	Dak..	5,000,000	200,000	25	*	....	....	.....	11,000,000	Nov	1887	.10
39	Derbec B. Grav., G. S.	Cal..	10,000,000	100,000	100	90, 0	Dec.	1881	.10	180,000	May	1887	.10
40	Dunkin, s. L.	Colo.	5,000,000	200,000	25	*	....	....	.....	330,000	Apl	1888	.15
41	Eclipse	Colo.	100,000	100,000	1	*	....	....	.....	20,000	Nov.	1887	.10
42	Elkhorn, G. S.	Mont	1,000,000	100,000	10	50,0 0	July	1883	.50	170,000	July	1887	.05
43	Empire Lt., G.	Mont	500,000	100,000	5	*	....	....	.....	7 ,500	Oct.	1887	.37½
44	Eureka Con., G. S. L.	Nev..	5,000,000	50,000	100	500,000	July	1886	1.00	4,906,000	May	1888	.25
45	Evening Star, s. L.	Colo.	500,000	30,000	10	*	....	....	.....	1,400,000	Nov	1883	.50
46	Excelsior, G.	Cal..	10,000,000	100,000	100	560,000	Sept	1885	1.00	875,000	Oct.	1880	.25
47	Father de Smet, G.	Dak..	10,000,000	100,000	100	200,000	Nov	1878	1.00	1,125,000	Dec.	1885	.20
48	Franklin, C.	Mich	1,000,000	40,000	25	220,000	Jun.	1871	....	640,000	Jan.	1886	1.00
49	Freeland, G. S. C.	Colo.	5,000,000	200,000	25	*	....	....	.....	190,000	July	1886	.10
50	Fresno Enterprise, G	Cal..	5,000,000	100,000	50	.....	....	Mch	1883	.10	110,000	July	1882	.10
51	Garfield Lt., G. S.	Nev.	500,000	100,000	5	.....	....	.....	.....	60,000	Mar.	1887	.12½
52	Golconda, G. S.	Idah.	1,000,000	100,000	10	*	....	....	.....	120,000	May	1888	.03
53	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	5,251,000	Mar.	1888	.50	3,836,800	Oct.	1870	10.00
54	Grand Central, s.	Ariz.	1,000,000	100,000	10	*	....	....	.....	625,000	Dec.	1882	.25
55	Grand Prize, s.	Nev.	10,000,000	100,000	100	570,000	Apl.	1886	.50	495,000	Mar.	1884	.25
56	Granite, s.	Colo.	125,000	125,000	1	*	....	....	.....	6,250	May	1883	.01
57	Granite Mountain, s.	Mont	10,000,000	400,000	25	*	....	....	.....	4,400,000	Apl.	1888	.50
58	Green Mountain, G.	Cal..	1,250,000	125,000	10	*	....	....	.....	212,000	Nov.	1881	.07½
59	Hale & Norcross, G. S	Nev..	11,200,000	112,000	100	5,086,000	July	1887	.50	1,654,000	May	1888	.50
60	Hall-Anderson, G.	N. S..	150,000	150,000	1	*	....	....	.....	7,000	Jan.	1882	.05
1	Hecla Con., S. G. L. C	Mont	1,500,000	30,000	50	.....	....	.....	.....	1,077,5 0	Dec	1887	.50
2	Hel'n Mg & Red, G. S. L	Mont	3,315,000	663,000	5	*	....	....	.....	197,97	July	1886	.06
3	Holmes, s.	Nev..	10,000,000	100,000	100	300,000	Sept	1885	.10	75,000	Apl.	1886	.25
4	Holyoke, G.	Idah.	200,000	200,000	1	.....	....	.....	.....	27 000	Feb	1883	.10
5	Homestake, G.	Dak.	12,500,000	125,000	100	900,000	July	1878	1.00	4,118,750	May	1888	.20
6	Honorine, s. L.	Utah	500,000	250,000	2	25,000	Jun.	1883	....	125,000	Sept	1887	.05
7	Hope, s.	Mont	1,000,000	100,000	10	*	....	....	.....	233,252	Apl.	1888	.25
8	Horn-Silver, s. L.	Utah	10,000,000	400,000	25	*	....	....	.....	4,000,000	Nov	1884	.50
69	Idaho, G.	Cal.	310,000	3,100	100	.....	....	.....	.....	4,846,75	May	1888	15.00
70	Ideal, s. L.	Colo.	1,500,000	50,000	10	*	....	....	.....	15,000	Dec.	1886	.05
71	Illinois, s.	N. M.	100,000	100,000	1	*	....	....	.....	25,000	Jan	1887	.25
72	Independence, s.	Nev..	10,000,000	100,000	100	340,000	Oct.	1886	.20	225,000	Sept	1879	.25
73	Indian Queen, s.	Nev..	250,000	125,000	2	*	....	....	.....	388,750	July	1883	.03
74	Iron Hill, s.	Dak.	2,500,000	250,000	10	101,250	Mar.	1888	.07½	156,250	Nov.	1887	.07½
75	Iron-Silver, S. L.	Colo.	10,000,000	500,000	2	*	....	....	.....	2,200,000	Feb.	1888	.20
76	Jackson, G. S.	Nev	5,000,000	50,000	100	10,000	Nov	1880	.20	45,000	Oct.	1886	.10
77	Jay Gould	Mont	2,000,000	4 ,000	5	*	....	....	.....	207,000	Apl.	1888	.09
78	Jocuistita, s.	Mex.	2,500,000	250,000	10	.....	....	.....	.....	1,200,000	Feb.	1885	.50
79	Jumbo, G.	Colo.	2,000,000	200,000	10	*	....	....	.....	35,000	Oct.	1887	.02½
80	Kentuck	Nev..	3,000,000	30,000	100	342,000	Nov	1881	.30	1,330,000	Dec.	1886	.10
81	La Plata, S. L.	Colo.	2,000,000	200,000	10	*	....	....	.....	610,000	Sept	1882	.30
82	Leadville Cons., S. L.	Colo.	4,000,000	100,000	10	*	....	....	.....	423,000	Apl.	1887	.05
83	Lexington, G. S.	Mont	4,000,000	40,000	100	*	....	....	.....	565,000	Jan.	1885	2.00
84	Little Chief, s. L.	Colo.	10,000,000	200,000	50	*	....	....	.....	780,000	Mch	1885	.10
85	Little Pittsburg, s. L.	Colo.	20,000,000	200,000	100	*	....	....	.....	1,050,000	Mch.	1880	.50
86	Manhattan, s.	Nev	5,000,000	50,000	100	250,000	Dec	1887	1.00	437,500	Feb	1886	.25
87	Marion Bullion, G.	N. C.	500,000	.....	....	.....	....	.....	.....	15,000	Jan.	1886	.....
88	Martin White, s.	Nev.	10,000,000	100,000	100	1,150,000	Mar.	1886	25	140,000	Dec.	1886	.25
89	Mary Murphy, G. S.	Colo.	350,000	3,500	100	*	....	....	.....	122,500	Feb.	1888	5.00
90	Minnesota, C.	Mich	1,000,000	40,000	25	420,000	Apl.	1888	1 00	1,826,000	Mar.	1876	.....
91	Mono, G.	Cal.	5,000,000	50,000	100	616,000	Sept	1887	.50	12,500	Mar.	1886	.25
92	Montana, Lt., G. S.	Mont	3,300,000	660,000	5	*	....	....	.....	2,010,934	Apl.	1888	.25
93	Morning Star, s. L.	Colo.	1,000,000	100,000	10	*	....	....	.....	775,000	Mar.	1888	.25
94	Moulton, s. G.	Mont	2,000,000	400,000	5	*	....	....	.....	380,000	Dec.	1887	.07½
95	Mount Pleasant, G.	Cal.	150,000	150,000	1	*	....	....	.....	150,000	Feb.	1887	.30
96	Mt. Diablo, s.	Nev	5,000,000	50,000	100	137,500	Jun.	1880	2.00	80,000	July	1885	.20
97	Napa, Q	Cal.	700,000	100,000	7	*	....	....	.....	290,000	Jan.	1881	.10
98	Navajo, G. S.	Nev..	10,000,000	100,000	100	485,000	Apl.	1888	.30	325,000	Feb.	1885	.25
99	N. Hoover Hill, G. S.	N. C.	300,000	120,000	2½	*	....	....	.....	30,000	Dec.	1885	.06¼
100	Northern Belle, s.	Nev..	5,000,000	50,000	100	425,000	Jan.	1884	8.30	2,400,000	Apl.	1883	.50
101	North Belle Isle, s.	Nev..	10,000,000	100,000	100	250,000	Mar.	1887	.50	233,000	May	1888	.50
102	Ontario, s. L.	Utah	15,000,000	150,000	100	*	....	....	.....	9,125,000	Apl.	1888	.50
103	Ophir, s.	Nev..	10,000,000	100,000	100	4,050,440	Aug	1887	.50	1,500,800	July	1882	1.00
104	Original, s. C.	Mont	1,500,000	60,000	25	*	....	....	.....	117,000	Dec.	1887	.05
105	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	1,122,500	Jun.	1888	1 00
106	Oxford, G.	N. S.	125,000	125,000	1	*	....	....	.....	38,500	Oct.	1885	.02
107	Paradise Valley, G. S	Nev.	10,000,000	100,000	100	62,000	Apl	1888	.15	150,000	Apl.	1887	.10
108	Parrott, C.	Mont	1,800,000	180,000	10	*	....	....	.....	154,000	Jan.	1888	.10
109	Peacock, S. G. C.	N. M.	2,000,000	200,000	10	*	....	....	.....	60,000	Nov.	1886	.....
110	Pleasant Valley, G. S.	Colo.	1,000,000	100,000	10	10,000	Mar.	1884	.10	30,000	Dec.	1882	.05
111	Plutus, G. S. C. L.	Colo.	2,000,000	200,000	10	*	....	....	.....	20,000	Feb.	1886	.10
112	Plymouth Con., G.	Cal..	5,000,000	100,000	50	*	....	....	.....	2,280,000	Feb.	1888	.40
113	Prussian, s. L.	Colo.	1,500,000	150,000	10	.....	....	.....	.....	132 000	Jan	1883	.10
114	Quicksilver, pref., Q.	Cal..	4,300,000	43,000	100	.....	....	.....	.....	1,353,192	Apr.	1888	2.00
115	" com., Q.	Cal..	5,700,000	57,000	100	.....	....	.....	.....	151,000	July	1882	.40
116	Quincy, C.	Mich	1,000,000	40,000	25	200,000	Dec.	1862	.....	4,770,000	Feb.	1888	4.00
117	Richmond, C.	Mich	1,350,000	45,000	30	*	....	....	.....	4,320,257	Jun.	1887	1.25
118	Ridge, C.	Mich.	500,000	20,000	25	219,939	Mar	1886	.50	93,785	Feb.	1880	.50
119	Rising Sun, s.	Dak..	750,000	150,000	5	*	....	....	.....	52,000	May	1881	.07½
120	Robinson Con., s. L.	Colo.	10,000,000	200,000	50	*	....	....	.....	585,000	Mar.	1886	.05
121	Robert E. Lee, s. L.	Colo	10,000,000	500,000	20	*	....	....	.....	100,000	Dec.	1882	.50
122	Rooks, G.	Vt..	500,000	50,000	10	*	....	....	.....	61,000	Apr	1885	.50
123	Savage, S.	Nev..	11,200,000	112,000	100	6,324,000	Sept	1887	50	4,460,000	July	1869	3.00
124	Security L. Mg., Mfg.	Colo.	1,000,000	100,000	10	*	....	....	.....	50,000	July	1884	.....
125	Shoshone, G.	Idah.	150,000	150,000	1	*	....	....	.....	7,500	Apl.	1883	.....
126	Sierra Buttes, G.	Cal..	2,225,000	122,500	10	.....	....	.....	.....	1,492,557	Apl.	1888	.12½
127	Sierra Grande, s.	N. M.	2,500,000	500,000	5	*	....	....	.....	880,000	Sept	1884	.25
128	Sierra Nevada, G. S.	Nev..	10,000,000	100,000	100	6,100,000	Apl.	1888	.25	102,000	Jan.	1871	1.00
129	Silver Cord, G. S. L.	Colo.	5,000,000	500,000	10	*	....	....	.....	225,000	Nov.	1883	.25
130	Silver King, s.	Ariz.	10,000,000	100,000	100	*	....	....	.....	1,950,000	July	1887	.25
131	Silverton, G. S.	Colo.	2,000,000	200,000	10	*	....	....	.....	80,000	Nov.	1886	.02
132	Small Hopes Cons., s.	Colo.	5,000,000	250,000	20	*	....	....	.....	3,112,500	Dec.	1887	.20
133	Smuggler, s. L.	Colo.	600,000	60,000	10	*	....	....	.....	66,700	Aug.	1883	.25
134	Socorro, C.	N. M.	250,000	2,5 0	100	*	....	....	.....	4,000	Mch	1882	.00¾
135	Spring Valley, G.	Cal..	200,000	2 ,000	1	50,000	Oct.	1886	.25	50,000	Jan	1884	.25
136	Standard, G. S.	Cal..	10 000,00	1 0 00	100	25,000	Oct.	1884	.25	8,590,000	May	1888	1.05
137	Stormont, S.	Utah	500,0 0	500,000	1	*	....	....	.....	155,000	Nov.	1881	.05
138	St. Joseph, L.	Mo..	1,500,000	150,000	10	*	....	....	.....	344,000	Dec.	1887	.20
139	Surinam, G.	D. G.	3,000,000	600,000	5	*	....	....	.....	105,000	Nov.	1887	.05
140	Swansea, C.	Colo.	600,000	60,000	10	*	....	....	.....	9,000	Apl.	1888	.02½
141	Syndicate, G.	Cal..	10,000,000	100,000	100	38,729	July	1882	.15	48,308	Sept	1885	.10
142	Tamarack, C.	Mich.	1,000,000	40,000	25	520,000	Apl.	1885	3.00	120,000	Apl.	1888	3.00
143	Tip Top, s	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov.	1881	.20
144	Tombstone, G. S. L.	Ariz.	12,500,000	500,000	25	*	....	....	.....	1,250,000	Apl.	1882	.10
145	United Verde, C.	Ariz.	3,000,000	300,000	10	*	....	....	.....	97,500	Feb.	1884	.20
146	Valencia, M.	N. M.	150,000	1,500	100	.....	....	.....	.....	37,500	Apl	1886	2.50½
147	Viola Lt., G. L.	Idah.	750,000	150,000	5	.....	....	.....	.....	222,500	Dec.	1887	.12
148	Vizina, s.	Ariz.	5,000,000	200,000	25	.....	....	.....	.....	140,000	Apl.	1882	.10
149	Yankee Girl	Colo.	2,500,000	250,000	10	.....	....	.....	.....	1,275,000	July	1887	.10
150	Yellow Jacket, G. S.	Nev..	12,000,000	120,000	100	5,448 000	Dec	1885	.75	2,184,000	Aug	1871	1.50

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par Value	Assessments. Total levied.	Date & am't of last.		
1	Agassiz Cons., s. L.	Colo.	$2,500,000	50,000	$50	*	....	....	....
2	Alhoues, C.	Mich	2,000,000	80,000	25	$577,000	Feb	1884	.....
3	Alpha Con., G. S.	Nev..	3,000,000	30,000	100	536,250	Jan.	1888	87½
4	Alta, s.	Nev..	10,080,000	100,800	100	2,191,200	May	1888	.50
5	Amador, G.	Cal..	400,000	200,000	2	*	....	....	....
6	American Flag, s.	Colo.	1,250,000	125,000	10	300,000	Jun	1877	.50
7	Anglo-Montana, Lt.	Mon.	600,000	120,000	5	*	....	....	....
8	Appalachian, Lt., G.	N. C.	1,500,000	300,000	5	*	....	....	....
9	Aspen Mg. & S., S. L.	Colo.	2,000,000	200,000	10	*	....	....	....
10	Barcelona, G.	Nev..	5,000,000	200,000	25	*	....	....	....
11	Bechtel Con., G.	Cal..	10,000,000	100,000	100	173,500	Jan.	1888	.10
12	Belmont, s.	Nev..	5,000,000	50,000	100	735,000	Apl.	1886	.10
13	Best & Belcher, G. S.	Nev.	10,080,000	100,800	100	2,004,190	Jan.	1888	.50
14	Big Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*	....	....	....
15	Bi-Metallic, s.	Mon.	5,000,000	200,000	25	*	....	....	....
16	Black Oak, G.	Cal..	3,000,000	300,000	10	*	....	....	....
17	Boston Con., G.	Cal..	10,000,000	100,000	100	170,000	Nov	1883	.25
18	Boston & Mont., C. S	Mon.	2,500,000	100,000	25	*	....	....	....
19	Bremen, s.	N. M	5,000,000	500,000	10	*	....	....	....
20	Brunswick, G.	Cal..	2,000,000	400,000	5	*	....	....	....
21	Bullion, G. S.	Nev..	10,000,000	100,000	100	3,957,000	Aug.	1887	.50
22	Bve and Bye,	Ariz.	1,000,000	100,000	10	*	....	....	....
23	Calaveras, G.	Cal..	500,000	500,000	1	*	....	....	....
24	Carisa, G.	Wy	500,000	100,000	5	*	....	....	....
25	Carupano, G. S. L. C.	Ven.	200,000	100,000	2	*	....	....	....
26	Cashier, G. S.	Colo.	500,000	250,000	2	*	....	....	....
27	Cen. Contin'l, G. S. L.	C. & A	2,000,000	250,000	10	*	....	....	....
28	Charles Dickens, G. S.	Idah.	1,250,000	250,000	5	*	....	....	....
29	Cherokee, G.	Cal..	1,500,000	150,000	10	*	....	....	....
30	Chollar, s.	Nev..	11,200,000	112,000	100	1,208,000	Dec.	1887	.50
31	Cinnamon Mt., G. S.	Colo.	750,000	150,000	5	*	....	....	....
32	Cleveland, T.	Dak.	1,000,000	500,000	2	*	....	....	....
33	Comstock, G. S.	Nev..	10,000,000	100,000	100	30 000	Mar.	1887	.15
34	Con. Imperial, G. S.	Nev..	5,000,000	50,000	100	1,175,000	Sept	1887	.25
35	Con. Pacific, G.	Cal..	6,000,000	60,000	100	177,000	Sept	1887	.10
36	Cons. Silver, s	Mo..	2,500,000	250,000	10	.....	....	.....	.....
37	**Cop. Queen Cons, C.	Ariz.	1,400 000	140,000	10	.....	....	.....	.....
38	Courtlandt	Colo.	500,000	50,000	10	*	....	....	....
39	Crescent, s. L.	Colo.	3,000,000	300,000	10	*	....	....	....
40	Crocker, s.	Ariz.	10,000,000	100,000	100	105,000	Feb.	1885	.20
41	Crowell, G.	N. C.	500,000	500,000	1	*	....	....	....
42	Dahlonega, G.	Ga..	250,000	250,000	1	*	....	....	....
43	Dandy, s.	Colo.	5,000,000	500,000	10	*	....	....	....
44	Dardanelles, G.	Cal..	1,000,000	100,000	10	*	....	....	....
45	Decatur, s.	Colo.	1,500,000	300,000	5	*	....	....	....
46	Denver City, s. L.	Colo.	5,000,000	500,000	10	*	....	....	....
47	Denver Gold, G.	Colo.	300,000	60,000	5	*	....	....	....
48	Durango, G.	Colo.	500,000	500,000	1	*	....	....	....
49	Eastern Dev. Co., Lt.	N. S.	1,500,000	150 000	10	990,000	Mar.	1888	1.00
50	El Cristo, G. S.	U.S.C	1,000,000	500,000	2	*	....	....	....
51	El Dorado, G.	Cal.	1,000,000	250,000	4	*	....	....	....
52	El Talento, G.	U.S.C	1,000,000	500,000	2	*	....	....	....
53	Empire, s.	Utah	10,000,000	100,000	100	*	....	....	....
54	Eureka Tunnel, s. L.	Nev..	10,000,000	100,000	100	*	....	....	....
55	Exchequer.	Nev.	10,000,000	100,000	100	770,000	Feb.	1888	.20
56	Found Treasure, G. S.	Nev..	10,000,000	100,000	100	12,000	Jan.	1882	.06
57	Gogebic I. Syn., I.	Wis.	5,000,000	200,000	25	.....	....	.....	.....
58	Gold Cup, s.	Colo.	500,000	500,000	1	*	....	....	....
59	Golden Era, s.	Mon.	2 000,000	200,000	10	*	....	....	....
60	Gold Placer, G.	Colo.	5,000,000	200,000	25	229,314	Dec.	1885	.32
61	Gold Rock, G.	Cal.	1,000,000	500,000	2	*	....	....	....
62	Goodsnaw, G.	D. M.	10,000,000	100,000	100	*	....	....	....
63	Grand Belt, C.	Tex.	12,000,000	120,000	100	.....	....	.....	.....
64	Grand Duke.	Colo.	800,000	80,000	10	*	....	....	....
65	Great Romance, G.	U.S.C	1,000,000	500,000	2	*	....	....	....
66	Gregory-Bontail, G.	Colo.	550,000	550,000	1	*	....	....	....
67	Gregory Con., G.	Mon.	3,000,000	300,000	10	*	....	....	....
68	Harlem M. & M. Co.,	Cal..	1,000,000	200,000	5	*	....	....	....
69	Head Cent. & Tr. s.	Ariz.	10,000,000	100,000	100	*	....	....	....
70	Hector, G.	Cal..	1,500,000	300,000	5	*	....	....	....
71	Highland, C.	Mich	500,000	25,000	25	*	....	....	....
72	Hollywood.	Cal..	200,000	100,000	2	*	....	....	....
73	Hortense, s.	Colo.	2,000,000	200,000	10	*	....	....	....
74	Huron, C.	Mich	1,000,000	40,000	25	280,000	May	1887	3.00
75	Iron Gold & Silver, s.	N. M.	2,000,000	200,000	10	*	....	....	....
76	Ironton, I.	Wis.	1,000,000	40,000	25	*	....	....	....
77	Iroquois, C.	Mich	1,250,000	50,000	25	*	....	....	....
78	J. D. Reymert.	Ariz.	10,000,000	100,000	100	*	....	....	....
79	Julia Cons., G. S.	Nev.	11,000,000	110,000	100	1,650,000	Apl.	1887	.10
80	Kearsarge, C.	Mich	1 250,000	50,000	25	190,000	Oct.	1887	1.00
81	Laclede.	N. M.	2,000,000	200,000	10	*	....	....	....
82	Lacrosse, C.	Colo.	1,000,000	100,000	10	*	....	....	....
83	Lee Basin, s. L.	Colo.	5,000,000	500,000	10	*	....	....	....
84	Lochiel, s.	N. M.	2,000,000	200,000	10	*	....	....	....
85	Lucerne,	Colo	5,000,000	500,000	10	*	....	....	....
86	Mammoth Bar., G.	Cal..	10,000,000	100,000	100	50,000	Dec.	1881	.....
87	May Belle, G.	Cal..	10,000,000

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	May 12.		May 14.		May 15.		May 16.		May 17.		May 18.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adams, Colo.													
Alice, Mont													
Argenta, Nev.													
Atlantic, Mich.													
Bassick, Colo.	.12	.11											300
Belcher, Nev													
Belle Isle, Nev.			.50										1,000
Bodie Cons., Cal.													
Breese, Colo.													
Bulwer, Cal											.95		200
Caledonia, Dak							2.00	1.90	2.00				459
Calumet & Hecla													
Catalpa													
Chollar, Nev.													
Chrysolite, Colo.													
Colorado Cent'l, Colo.	2.10	1 90							2.00				400
Cons. Cal. & Va., Nev.	11.75		12 13		11.63	11.50	11.38		11 13		11.25	10 50	1,325
Crown Point, Nev													
Deadwood, Dak													
Dunkin, Colo.													
Eureka Cons., Nev					10.00		10 00	9.75	9.50	9 25			440
Father de Smet, Dak.													
Freeland, Colo.													
Gould & Curry, Nev.							4.55						100
Grand Prize, Nev.													
Green Mountain, Cal.													
Hale & Norcross, Nev.	7.75		8.13	8.00	7.88								600
Holyoke, Idaho													
Homestake, Dak.					11.00						11.75		35
Horn-Silver, Ut.													100
Iron Hill, Dak.													
Iron Silver, Colo.			3.50		3.90	3 80					3.75		1,050
Leadville C., Colo.			.30	.29			.30		35	.32	.34	.30	3,500
Little Chief, Colo.					.24	.21			25				625
Little Pittsburg, Colo.									20				400
Martin White, Nev.													
Mono, Cal													
Mouiton, Mont													
Mount Diablo, Nev.													
Navajo, Nev.	1.45						1.70		1.70		1.70		1,739
North Belle Isle, Nev.							4.35	4.25	4.25		4 95	4 20	610
Ontario, Ut			29 00		29.00						30.00		220
Ophir, Nev.	8.25		8.63										400
Pewabic, Mich.													
Plymouth, Cal.			10 00		10.50	10.00	9.50		9.25				880
Quicksilver Pref., Cal.													
" Com., Cal.													
Quincy, Mich.													
†Ridge, Mich.													
Robinson Cons., Colo.													
Savage, Nev.	5.00								4.95				400
Sierra Nevada, Nev.	4.20				4.00								200
Silver King, Ariz.	5.00		5.00								5.00		180
Small Hopes, Colo.													
Standard, Cal.					2.00								20
Stormont, Ut.													
Yellow Jacket, Nev.			6.50						5.88		6.25		500

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	May 12.		May 14.		May 15.		May 16.		May 17.		May 18.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
†Allouez, Mich.													
Alta, Nev.													
Amador, Cal.	2.00		2.00		2.00		2.00		2.00		2.00		5,500
Am'can Flag, Colo.													
Barcelona, Nev.	.85	.65	.95	.87	.93	.85	.89	.88	.88		.86	.83	23,550
Bechtel Con., Cal.													
Best & Belcher, Nev.	4.65										4.30		400
Brunswick, Cal.			.20	.19	.20	.19	.20	.19			.20	.18	7,400
Bullion, Nev.	2.00				2.05				2.10		2.15		400
Carupano, Venez.													
Cashier, Colo							.11		.11		.11		1,800
Castle Creek, Id.											.08		1,100
Central Ariz., Ariz.													
Cleveland, Dak.													
Confidence, Nev.													
Con. Imperial, Nev					$ 50								1,000
Con. Pacific													
Denver City, Colo.	.20						.20						2,300
Eastern Oregon													
El Cristo, U. S. Col.	2.10		2.10		2.10		2 10		2.15	2.10	2.10		1,400
Excelsior, Colo.													
Exchequer, Nev.	1.95		1 90										400
Found Treas'e, Nev.													
Hector, Cal.													
Hollywood, Cal.	.28		.28	.27	.30	.29	.30	29	.30		.29		6,600
Huron, Mich.													
Juila, Nev.	.55		.55		.55						.60		1,100
Kingst'n & Pemb'ke	2 88						2.75						200
Kossuth, Nev.													
Lacrosse, Colo	1		12	.11									4,100
Lee Basin, Colo.													
Mexican, Nev.													
Middle Bar, Cal.	.45						.46	.45	.46		.46	.45	2,200
Moniter, Colo.	.13	.12	.13		.13				.13		.13		2,000
Pri'nt'a Mi'r, Nev.													
Phœnix Lead													
Phœnix of Ark.			.50										200
Potosi, Nev.													
Proustite, Idaho	1.25		1.30	1.25	1.20	1.05	1.15	1.10	1.20	1.10	1.15		9,000
Rappahann'k, Va.	.13				.13	.12	.11		.13	.12	.12		5,300
San Sebastian, S'nS	.90		.91		.91		.95	.93	.90				900
Santiago, U. S. Col.													
Scorpion, Nev													
*Security, Colo.					.15	.15					.12		400
Shoshone, Idaho	.13	.11	.13	.12	.14		.15	.14	.14		.15	.14	9,100
Silver Cliff, Colo.	09												300
Silver Cord													
Silver Hill													
Silver Mg. of L. V.													
Silver Queen, Ariz.													
Sutro Tunnel, Nev.	.14		.14		.14		.13	.12	.13	.13	.11		14,500
Taylor Plumas, Cal.					.02	.01	.02		.01	01			13,700
Tioga, Cal.										.20	.10		200
Tornado, Nev.													
Union Cons., Nev.	3.35												200
Utah, Nev													
Washington, Mich.													

*Dealt in at the New York Stock Ex. Unlisted Securities. †Dealt in at the Metal Ex. ‡Ex-stock dividend. Dividend shares sold, 15,968. Non-dividend shares sold, 116,250. Total New York, 132,218

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	May 11.		May 12.		May 14.		May 15.		May 16.		May 17.		SALES.
Atlantic, Mich.			17.00		17.00		17.50		17.50				225
Bodie, Cal.													
Bonza D.	1 63		1.50		1.75	1.63	2.00	1.75	1.81	1.75	1.81	1.75	15,975
Boston & Mont., Mont													
Breece, Colo.			.33		.33								600
Calumet & Hecla, Mich	239				247	239½	246	245			246	245	376
Catalpa, Colo.									.20		.20		800
Central, Mich.													
Chrysolite, Colo													
Con. Cal. & Va., Nev.													
Dunkin, Colo.			.91	.90	*.93	.90	.90	.85	.90	.85	.88		1,820
Enterprise													
Eureka, Nev.													
Franklin, Mich.	14 63	14.50			15.50	14.75	15.50	15.25	15.25	14 88	15.00	14.75	1,219
Freeland, Colo.													
Hale & Norcross													
Honorine, Utah													
Ironton Iron Co., Mich													
Little Chief, Colo.													
Little Pittsburg, Colo.													
Martin White, Nev.													
Napa, Cal.	1.63		1.75		1.75		1.75		1.75		€1.75		700
Osceola, Mich.	21.00		20 75		22.25	21.75	22.75	22.50	22.75	22.25	22.50		755
Pewabic, Mich.									2.75				100
Quincy, Mich.	69.50	69.00	70.00		72.50	70.00	73.00	72.50	72.00		72.00		732
Ridge, Mich.													
Sierra Nev., Nev.													
Silver King, Ariz.													
Standard, Cal.													
Tamarack, Mich.							160				165	161	13

NAME OF COMPANY.	May 11.		May 12.		May 14.		May 15.		May 16.		May 17.		SALES.
Allouez, Mich.	1.63	1.50			1.63	1.50	1.63		1 56		1.50	1.38	1,050
Arnold, Mich.			20										300
Aztec, Mich													
Boston & Mont.			44 00		45.00	44.50	44.50	44.00	44.50		44.00	43.00	975
Bowman													
Brunswick, Cal.	.22								.22		.20		900
Crescent, Colo.	.19												150
Cusi, N. Mex.			.06		.06						.06		2,100
El Cristo, U.S. Col													
Everett	.28		.30		.30		.30				27.50		800
Hanover, Mich.													
Honorine													
Humboldt, Mich.	.15										.10		200
Hungarian, Mich.	.10												100
Huron, Mich.					4.50								100
Kearsarge, Mich.	6.63				6 75		7.00		6.88		6.75		360
Mesnard	.20												100
National, Mich.													
Oriental & M., Nev.													
Rappahannock, Va.			.14		.14		.14		.13		.14		2,200
Royal, Mich													
Security, Colo.													
Simpson	.14		.16		.15	.14	.13		.12				4,600
South Side, Mich.													
St. Louis, Mich.													
St. Mary's	.20												100
Sutro Tunnel, Nev.													
Taylor Plumas, Cal													
Washington, Mich.									.20				200
Winthrop, Mich.	.20												100

* Ex dividend. Boston: Dividend shares sold, 23,015. Non-dividend shares sold, 14,325. Total Boston, 37,340.

COAL STOCKS.

NAME OF COMPANY.	Par val. of sh'rs.	May 12.		May 14.		May 15.		May 16.		May 17.		May 18.		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Cameron Coal	100							20						100
Ches. & O. RR.	100											1⅜		10
Chic. & Ind. Coal RR.	100													
Do. pref.	100													
Col. & Hocking Coal	100											20⅝		100
Col., C. & I	100	35⅛	34¾	35⅛	35¼							34¾		727
Consol. Coal	100	20⅛												100
Del. & H. C.	100	108⅞	108½			109	108⅝	109⅜	109¼	109⅝	109⅛	109⅝	109⅜	1,688
D., L. & W. RR.	50	129⅜	128⅞	129½	129⅛	129¼	128⅝	130	129⅞	129⅞	129¼	129¾	129⅛	54,925
Hocking Valley	100			22						20¾				800
Hunt. & Broad Top										16				10
Do. pref.								39	38⅞	39¼				383
Lehigh C. & N.	50	49¼	49			49⅝		49⅝	49¼	49½				455
Lehigh Valley RR.	50	52⅞	52¾	52⅞	52⅝	52¾	52⅝	52⅞	52¾	52⅞	52¾			897
L. & W. C. & I. Co														
Mahoning Coal RR.	100													
Marshall Con. Coal	100							10¾	10⅛	12	11¼			350
Maryland Coal	100													
Montauk Coal	50													
Morris & Essex	100													
New Central Coal	100													
N. J. C. RR.	50	84½	83¾	84½	84	83½	82⅞	83⅞	83⅛	83⅞	83¾	83½	83⅛	6,777
N. Y. & S. Coal	100													
N. Y., Susq. & Western	100	8½		8½		8¼		8¾		8⅞				275
Do. pref	100									30½	30⅝			180
N. Y. & Perry C. & I.	100													
Norfolk & Western R.R.	100	18¾		48½		47⅝		47⅞		18½		18¾	47¾	300
Do. pref	50	48								48		48⅛		2,010
Penn. Coal	50													
Penn. RR.	50	52¾	52⅛	52⅞	52⅝	52¾	52⅝	52¾	52½	52¾	52⅝			3,867
Ph. & R. RR.**	50	61¼	60⅝	61⅝	61	61¼	60¼	61¾	60¾	61⅞	61¼	63½	61⅛	335,897
Tennessee C. & I. Co.	100	28	26½	27						26¾	26½	26⅝		710
Westmoreland Coal	100					68				68				53
Whitebreast Fuel Co.														

**Of the sales of this stock, 67,827 were in Philadelphia, and 268,070 in New York. Total sales, 410,614.

San Francisco Mining Stock Quotations.

COMPANY.	CLOSING QUOTATIONS. May 11.	May 12.	May 14.	May 15.	May 16.	May 17.
Alpha						
Alta	1.50	1.50	1.25	1.20	1.20	1.10
Belcher						
Belle Isle	.45	.45	.45	.45	.45	.50
Best & Bel.	4.25	4.25	4.20	4.25	4.25	4.20
Bodie	2.60	2.60	2.70	2.60	2.60	2.50
Bulwer			.70			.65
Challar	4.20	4.20	4.05	3.85	3.85	3.85
C'm'weal'h						
Con. C. & V	11.00	11.00	11.12½	11.12½	11.12½	10.87½
Con. Pac.						
Crown Pt.	5.25	5.25	6.12½	5.87½	5.87½	5.75
Eureka C.						9.00
Gould & C.	4.25	4.25	4.20	4.25	4.25	4.20
Grd. Prize.	2.05	2.05	2.10			2.15
Hale & N.	7.75	7.75	7.62½	7.87½	7.87½	7.75
Mexican	4.15	4.15	4.20	4.25	4.25	4.30
Mono	1 65	1.65	1.75	1.60	1.60	
Mt. Diablo						
Navajo	1.50	1.50	1.85			1.80
Nev. Queen	3.70	3.70	3.85			4.10
N. Belle I.	4.10	4.10	4.10	4.10	4.10	4.00
Ophir	7.62½	7.62½	7 62½	7.87½	7.87½	7.62½
Potosi	3.80	3.80	3.85	3.80	3 80	3.75
Savage	4.85	4.85	4.90	4.85	4.85	4.90
Scorpion						
Sierra Nev	3.95	3.95	3.95	4.00	4.00	4.10
Sutro Tun.						
Tip Top						
Union Con.	3.20	3.20	3.30	3.30	3.30	3.45
Utah	1.45	1.45	1.50	1.40	1.40	1.45
Yellow Jkt.	5.75	5.75	5.87½	5.87½	5.87½	5.62½

and declined from 16 to 12c. Silver Cliff shows one sale at 9c. Monitor a few at 12 and 13c. Lacrosse at 11 and 12c. Denver City at 20c. Cashier at 11c. Little Pittsburg at 20c. Little Chief at from 21 to 25c. Leadville at from 29 to 35c. Considerable business was done in Iron Silver at from $3.75 to $3.90. A few shares of Colorado Central sold at from $1.90 to $2.10, and of Bassick at 11 and 12c.

Barcelona shows the largest business on the list, amounting to 23,550 shares, at prices varying from 65@95c.

Sutro Tunnel went from 14@11c. In our mining news we publish some reports of interest to the stockholders.

Consolidated California & Virginia went from $12@$10.50. Hale & Norcross advanced from $7.75@$8.13. Ophir from $8.25@$8.63. The other Comstock shares show but little change.

Eureka Consolidated showed some activity, declining from $10 to $9.25.

Navajo advanced from $1.45 to $1.90. Belle Isle shows one transaction of 1000 shares at 50c. per share.

There is little or nothing doing in Rappahannock at from 11 to 13c.

Cleveland tin has been neglected this week; no sales are reported. This stock, which was listed about two months ago, has received but little attention, investors having little faith in the glowing reports published by the promoters of this concern in particular, and of other Dakota tin mines in general. What is wanted to inspire confidence and open a market is more development, more work and fewer promises. A single month's good and well authenticated mill runs would be worth more to Dakota than reams of glowing reports and newspaper puffs.

The Homestake Company has just declared its usual monthly dividend of $25,000. The stock continues to show but a small business, and sold this week at from $11 to $11.75. Caledonia is quoted at from $1.90 to $2.

The Daly Mining Company, of Utah, has just declared dividends Nos. 14 and 15, of $75,000, making a total to date of $600,000. Messrs. Lounsbery & Co., of this city, are now offering some of this stock for sale. The mine is spoken of in the highest terms, and it is claimed for it that it will be another Ontario; indeed, it is on the immediate extension of the Ontario vein.

On Monday a sale of one share of Taylor Plumas was reported at 45c. This does not indicate any advance in the price of the stock, and we are advised by the officers of the company that any amount up to 10,000 shares may be purchased at one cent assessment unpaid, and five cents for assessment paid. The transactions this week amounted to 13,700 shares at 1@2c.

The manipulators of Hollywood have not been able to put the price above 30c. The price of Amador was continued at $2, and that of Middle Bar at 45 and 46c.

The "Bodies" have almost dropped out of sight. Standard shows only one sale of 20 shares at $2 per share, and Bulwer one of 200 at 95c. per share. Bodie and Mono did not appear on the list at all.

Plymouth Consolidated shows a further decline as compared with last week; the last sale was made at $9.25.

Proustite continues to decline and this week went as low as $1.05; later it advanced again to $1.20, and sales were made to-day at $1.15.

Shoshone was active at from 11@15c. Castle Creek was not dealt in until to-day, when it sold at 8c.

El Cristo is yet far from the $20, not to say the $50, points which its chief manipulator, Mr. A. Harpending, recently predicted it would reach in the near future. The stock was very quiet this week at from $2.10 to $2.15, only a few (1400) shares changing hands at that price.

Private reports from the mine are not altogether favorable, due possibly to the fact that visitors are strictly forbidden admittance to the mine, almost always a bad sign.

Some business was done in San Sebastian at from 90@95c.

Kingston and Pembroke shows a sale of only 200 shares at from $2.88@$2.75.

Silver King was firm all week at $5.

Meetings.

The annual and special meetings of the following companies will be held on the dates given:

Pewabic Mining Company, 15 Congress street, Rooms 11-12, Boston, Mass., adjourned meeting held on the 15th inst., there being only one lawyer and one stockholder present, adjournment was made to June 25th, at 11 o'clock A.M.

Quincy Mining Company, No. 52 Broadway, Room 70, New York City, June 6th, at eleven o'clock A.M.

Dividends.]

Daly Mining Company, of Utah, has declared dividends Nos. 14 and 15, of twenty-five cents per share each, or $75,000, payable May 31st, at Messrs. Lounsbery & Co., No. 15 Broad street, New York City.

Homestake Mining Company, of Dakota, has declared dividend No. 118, of twenty cents per share, or $25,000, payable May 25th, at Messrs. Lounsbery & Co., No. 15 Broad street, New York City.

Idaho Gold Mining Company, of California, has declared a dividend, No. 223, of fifteen dollars per share, or $46,500.

Live Oak Drift Gravel Mining Company, of California, has declared a stock dividend of eleven per cent on all outstanding shares, payable May 7th, at No. 328 Montgomery street, Room 24, San Francisco, Cal.

Manhattan Silver Mining Company, of Nevada, has declared a stock dividend of one share for every share now outstanding, payable May 7th, in San Francisco.

Osceola Consolidated Mining Company, of Michigan, has declared a dividend, No. 23, of one dollar per share, or $50,000, payable June 15th, at 69 Devonshire street, or 246 Washington street, Boston, Mass.

Assessments.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of sale.	Am'nt per share.
Alta, Nev.	37	May 15	...	...	.50
Anna, Dak.	1	Apr. 10	May 10	June 1	.001
Anchor, Utah.	..	Mar. 3	May 5	May 26	.10
Arnold, Ariz.	4	May 1	June 4	June 26	.75
Baltimore, Nev.	1	Apr. 16	May 21	June 8	.25
Big Hole Pl., Utah.	3	May 7	*J'ne12	Aug. 15	.01
Bulwer Cons., Cal.	4	May 3	June 7	July 5	.20
Crown Point, Nev.	49	Apr. 13	May 16	June 6	.50
Homeward B'd, Dak.	5	Mar. 24	May 26	June21	.001
Himalaya, Utah.	3	Apr. 26	May 26	June26	.005
Justice, Nev.	46	May 7	June11	July 2	.25
K. of the West, Ida.	3	Apr. 21	May 24	June16	.15
Last Chance, Nev.	10	May 7	May 8	June30	.10
Mayflower, Cal.	41	Apr. 9	May 10	June 4	.25
Navajo, Nev.	19	Apr. 12	May 17	June 7	.30
New La Plata, Dak.	2	May 7	June 7	June25	.001
Oxford, Dak.	2	Apr. 9	May 9	May 25	.005
Paradise Valley, Nev.	5	Apr. 21	May 29	June18	.15
Peerless, Ariz.	11	Apr. 4	May 7	May 28	.25
Quincy, Dak.	3	Mar. 3	May 2	May 25	.02½
Rattler-Gilroy, Dak.	11	Apr. 7	May 7	May 31	.02
Sierra Nevada, Nev.	91	Apr. 3	May 8	May 28	.25
Silver Mint, Dak.	1	Apr. 3	May 5	May 23	.01
Spanish, Cal.	2	Jan. 4	Mar. 10	June 2	.04
South End, Nev.	..	Apr. 4	May 7	May 23	.10
Trojan, Nev.	17	Mar. 27	May 4	May 28	.10
Utah, Nev.	4	May 4	June 8	June26	.25

* One half cent a share is delinquent if unpaid June 12th, and the other if unpaid July 12th.

Financial Statements.

The following are the financial balances of the various mining companies on May 1st:

CASH ON HAND.

Alpha Con.	$19,930.93	Independence.	$5,139.15
Andes.	21,511 87	Julia.	969.63
Belcher.	23,744.98	Mexican.	14,541.43
Belle Isle.	10,231.49	Mono.	23,257.36
Bodie.	59,220.97	North Belle Isle.	48,030.21
Bullion.	18,391 27	Ophir.	5,657.39
*Con. Cal. & Va.	113,641.54	Occidental.	209.06
Challenge.	4,078.12	Overman.	33,489.72
‡Confidence	140,157.64	Peerless.	24,601.34
Crocker.	18,714.83	Poudere.	275 40
Exchequer.	16,210.91	Standard.	62,625 26
Found Treasure.	2,739.37	Tioga.	56.49
**Gould & Curry	21,295 53	Utah.	3,664.36
†Hale & Norcross	104,097.77	Union.	30,549.72
Imperial.	8,038.11	Weldon.	4,839.18

‡With $20,000, the assay value of the closing bullion shipment for April, to be added.

*Cash in bank and unsold bullion on hand of the value of $243,859.18, with yesterday's shipment of $125,000 to arrive.

**With a balance of $3900 to be collected on assessment levied and bullion shipments to be received.

†Including $16,000 assay value of fine silver and other shipments yet to arrive, which will swell the April product to nearly $150,000.

INDEBTEDNESS.

Best & Belcher.	$206.16	Nevada Queen.	$17,679.71
Commonwealth.	1,289 48	Potosi.	42,835 57
*Choliar.	32,610.95	†Savage.	45,439.82
Crown Point.	11,792.69	Seg. Belcher.	21,273.75
Grand Prize.	21,823.28	Sierra Nevada.	2,883.68

*Less $13,461.25, assay value of unsold bullion on hand.

†Less 10,147 ounces of fine silver bullion and other shipments to be received before the fiscal month closes.

Pipe Line Certificates.

Messrs. Watson & Gibson, brokers, 49 Broadway, report as follows for the week:

The petroleum market this week has been strong and upward in its tendency on the approach of the season for export of refined. The conclusion of operators has been that refiners would favor an advance in crude to stimulate free buying of kerosene. We do not feel over confident of a permanent advance in petroleum. Russia is invading foreign markets, and is each season becoming a more dangerous rival of the American article. It is claimed that no satisfactory method has been found yet for refining Ohio oil, but if not already found, we believe it will be. The production there now equals nearly half of the Pennsylvania output, and only 15c. is paid for it, a poor incentive for drilling.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 12.	86⅞c.	87⅝c.	86¼c.	86¾c.	446,000
14.	86½	87¾	86	86¾	755,000
15.	86⅞	88	86¾	87⅛	659,000
16.	88	89⅛	87⅞	88⅞	1,391,000
17.	89	90¼	89	89⅝	1,155,000
18.	89⅛	90¼	88⅞	88⅞	1,279,000
Total sales in barrels					5,685,000

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 12.	86⅞c.	87⅝c.	86⅝c.	86¾c.	212,000
14.	86½	87⅝	86½	86¾	347,000
15.	86⅞	87⅝	86⅝	87⅛	199,000
16.	88⅛	89⅛	88¼	88⅞	766,000
17.	89	90¼	89	89¼	557,000
18.	89½	90⅛	88⅝	88⅞	332,000
Total sales in barrels					2,413,000

Boston Mining Stocks. May 17.

[From our Special Correspondent.]

A better feeling has prevailed in mining stocks during the past week, and we have to record a more active market and better prices for nearly all of the copper stocks. In the early dealings quite a boom was started on the strength of the ingot copper market, and it looked as if we were to have a genuine and sustained advance all along the line; but during the past two days the market cooled off and quotations are a shade under the highest prices for the week.

Calumet & Hecla, on reports from the mine relating to the probable extinguishment of the fire, took a jump from $239 to $249, with quite a good buying demand, and was fairly well sustained, declining only to $245 on a small lot.

Quincy advanced from $69 to $73, at which price quite a large lot was taken, reacting to $72½ on small sales.

Franklin was also in good demand and advanced to $15⅛, with a reaction to $14¾, same as closing price of last week.

Osceola, on the announcement of a dividend of $1 per share, advanced to $22¾, a gain of $1⅛ over last week, the last sale being at $22⅛.

Boston & Montana opened at $44 and advanced to $45, at which price over 500 shares were taken, after which it declined to $44 and closed at $44⅛. The $200,000 of bonds will be placed at an early date, probably in London. The proceeds will be used for the payment of machinery that has been purchased. A dividend on the stock is, according to present indications, coming much earlier than has been generally anticipated.

Atlantic sold in a small way at $17@$17⅛.

Kearsarge at $6¾.

Allouez declined to $1⅛@$1⅝. Tamarack advanced from $150@$161 on very small sales. The rights declined from $10 to $8⅛, with later sales at $9.

It stated that the Tamarack Mining Company will undoubtedly declare a dividend of $3 per share July 1st, after which it will carry a surplus of about $500,000.

Bonanza has been very active on the report that negotiations are in progress for the sale of the Santa Rita property, and advanced to $2, with a reaction to $1¾, at which it is quite steady.

The silver stocks have been very dull and without special feature. Napa Quicksilver sold at $1⅝, and Dunkin declined to 85c.

The Security Mining and Milling Company has issued a circular giving notice of a debt of $185,000, contracted for development, and asking shareholders for a loan of 25 cents per share to continue the work. The stock can not be assessed. The stock is now selling at 10@12½c. per share.

Dispatches from Boston on the 18th inst. give the following prices:

Allouez, $11; Calumet & Hecla, $247; Osceola, $22.13; Tamarack, $160 bid, $170 asked.

Birmingham Stock Market.

The Birmingham Stock Exchange has decided to list every stock company in that district worthy of public confidence and investigation. A number of coal and iron and other companies have availed themselves of this opportunity, as will be seen by reference to our tables published elsewhere, giving the prices of the different stocks now being quoted.

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